สยามจำนาญกิจ
SIAM CHAMNAN KIT

Redis Workshop

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Somkiat Puisungnoen

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Somkiat Puisungnoen

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When did you work at Opendream?

••• 22 Pending Items

Intro

Software Craftsmanship

Software Practitioner at สยามชำนาญกิจ พ.ศ. 2556

Agile Practitioner and Technical at SPRINT3r

Post | Photo/Video | Live Video | Life Event

What's on your mind?

Public | Post

Somkiat Puisungnoen

15 mins · Bangkok ·

Java and Bigdata

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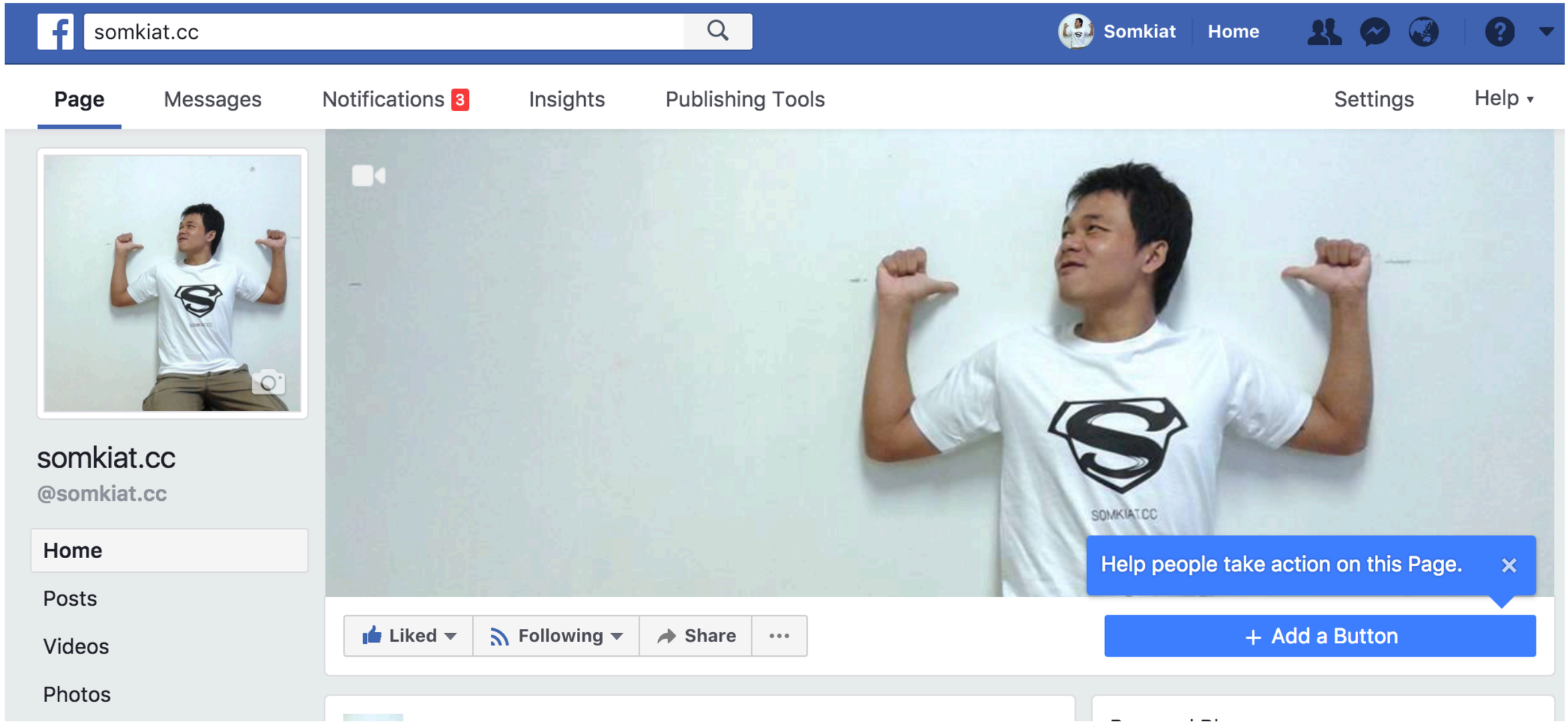

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https://redis.io/

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https://github.com/up1/course-redis

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Database Ranking

Rank			DBMS	Database Model	Score		
Aug 2022	Jul 2022	Aug 2021			Aug 2022	Jul 2022	Aug 2021
1.	1.	1.	Oracle	Relational, Multi-model	1260.80	-19.50	-8.46
2.	2.	2.	MySQL	Relational, Multi-model	1202.85	+7.98	-35.37
3.	3.	3.	Microsoft SQL Server	Relational, Multi-model	944.96	+2.83	-28.39
4.	4.	4.	PostgreSQL	Relational, Multi-model	618.00	+2.13	+40.95
5.	5.	5.	MongoDB	Document, Multi-model	477.66	+4.68	-18.88
6.	6.	6.	Redis	Key-value, Multi-model	176.39	+2.77	+6.51
7.	7.	7.	IBM Db2	Relational, Multi-model	157.23	-3.99	-8.24
8.	8.	8.	Elasticsearch	Search engine, Multi-model	155.08	+0.75	-2.01
9.	9.	↑ 10.	Microsoft Access	Relational	146.50	+1.41	+31.66
10.	10.	↓ 9.	SQLite	Relational	138.87	+2.20	+9.06
11.	11.	11.	Cassandra	Wide column	118.15	+3.74	+4.49
12.	12.	12.	MariaDB	Relational, Multi-model	113.89	+1.37	+14.92
13.	13.	↑ 23.	Snowflake	Relational	103.12	+3.97	+56.58
14.	14.	↓ 13.	Splunk	Search engine	97.44	-0.76	+6.84

https://db-engines.com/en/ranking

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Redis

REmote **D**ictionary **S**erver

Key-value database

Keep data in memory (save to disk !!)

Expiration data

Data structure server

Improve from Memcached

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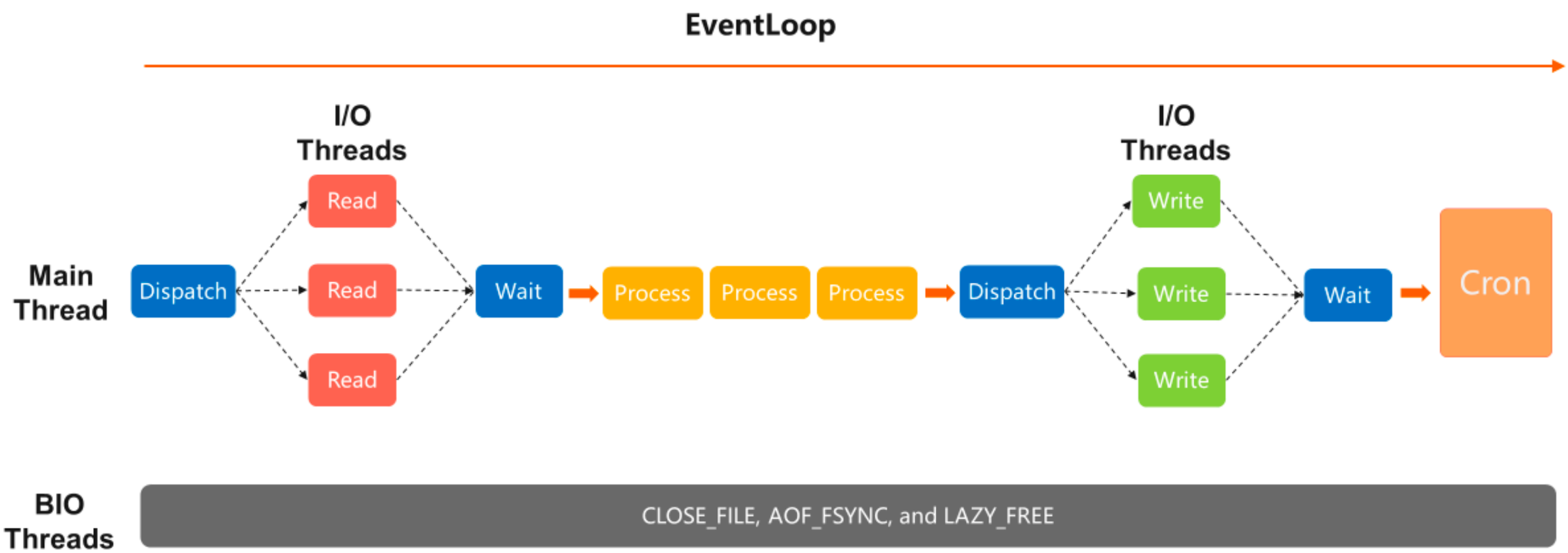
Redis

Single thread

Bottleneck on memory and network

Redis 4.x+ have more threads for I/O



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Use cases

Cached data
Message broker (pub/sub)
Session/token data
Job queue
View count

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Cached data

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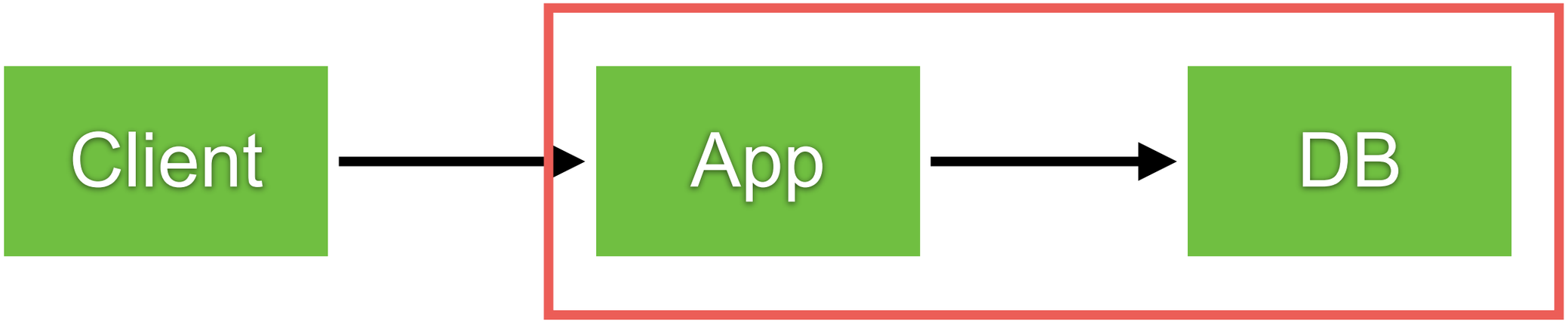
Cached data



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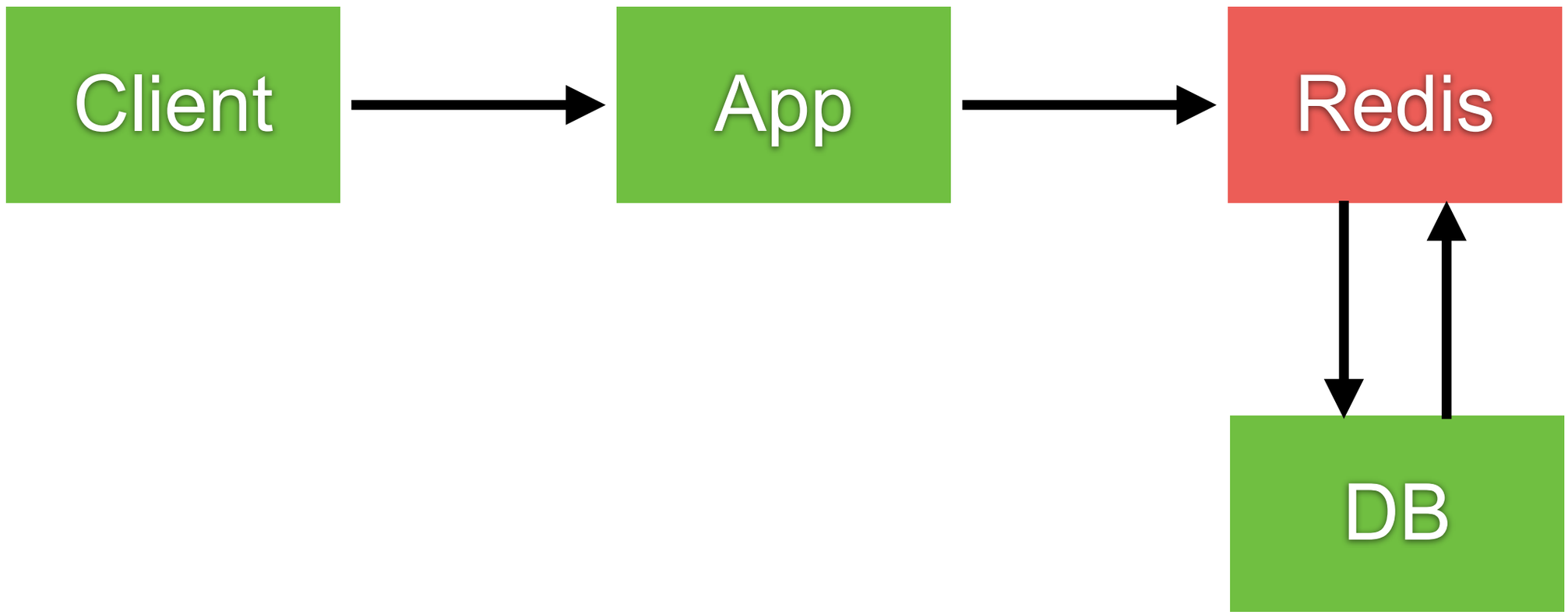
Cached data



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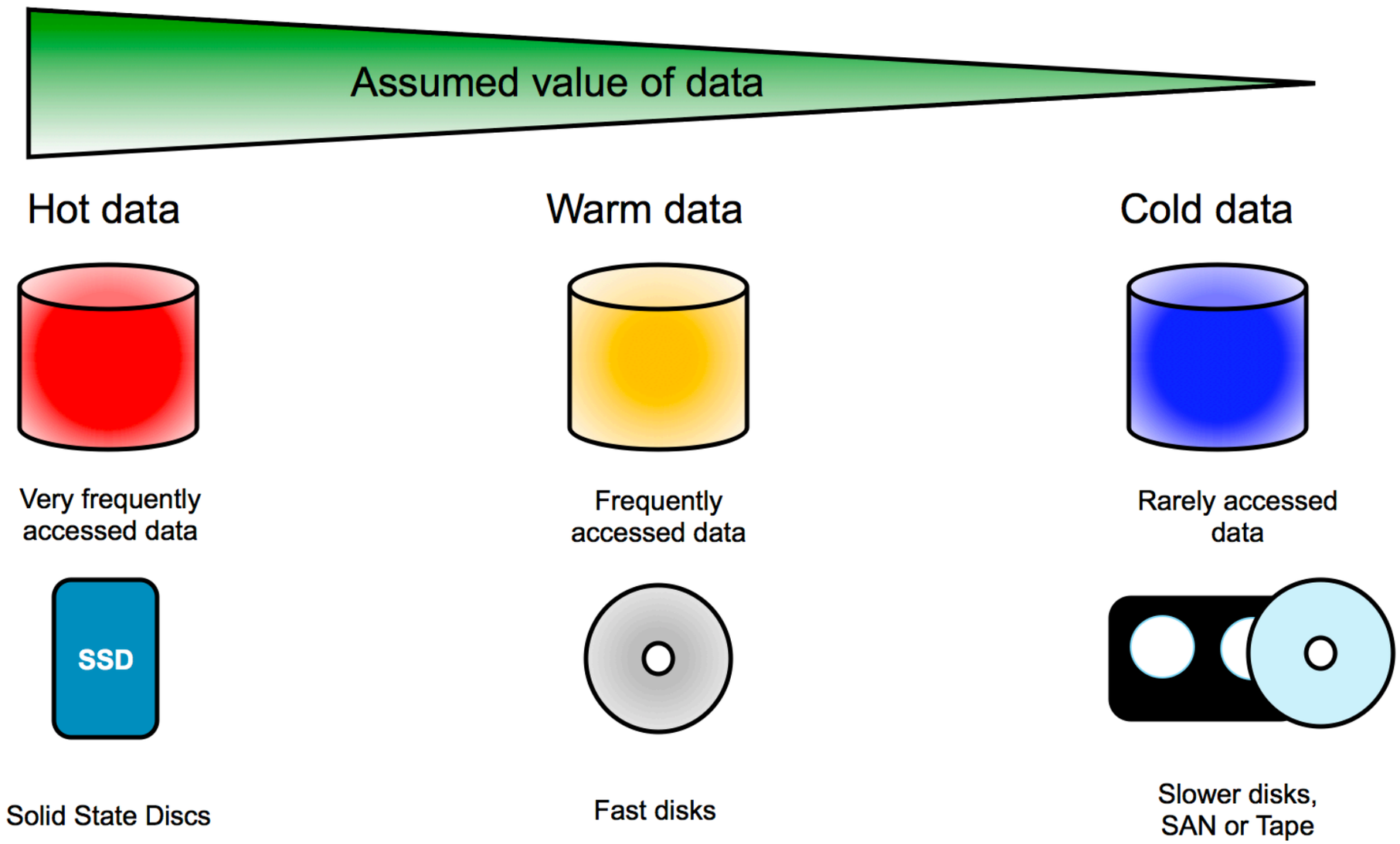
Types of data



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Pros

Faster reads and writes
Easy to manage data
Efficient persistency management

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Cons

Working with small data (memory capacity)
Not suitable for **durable** app
Frequent schema changes

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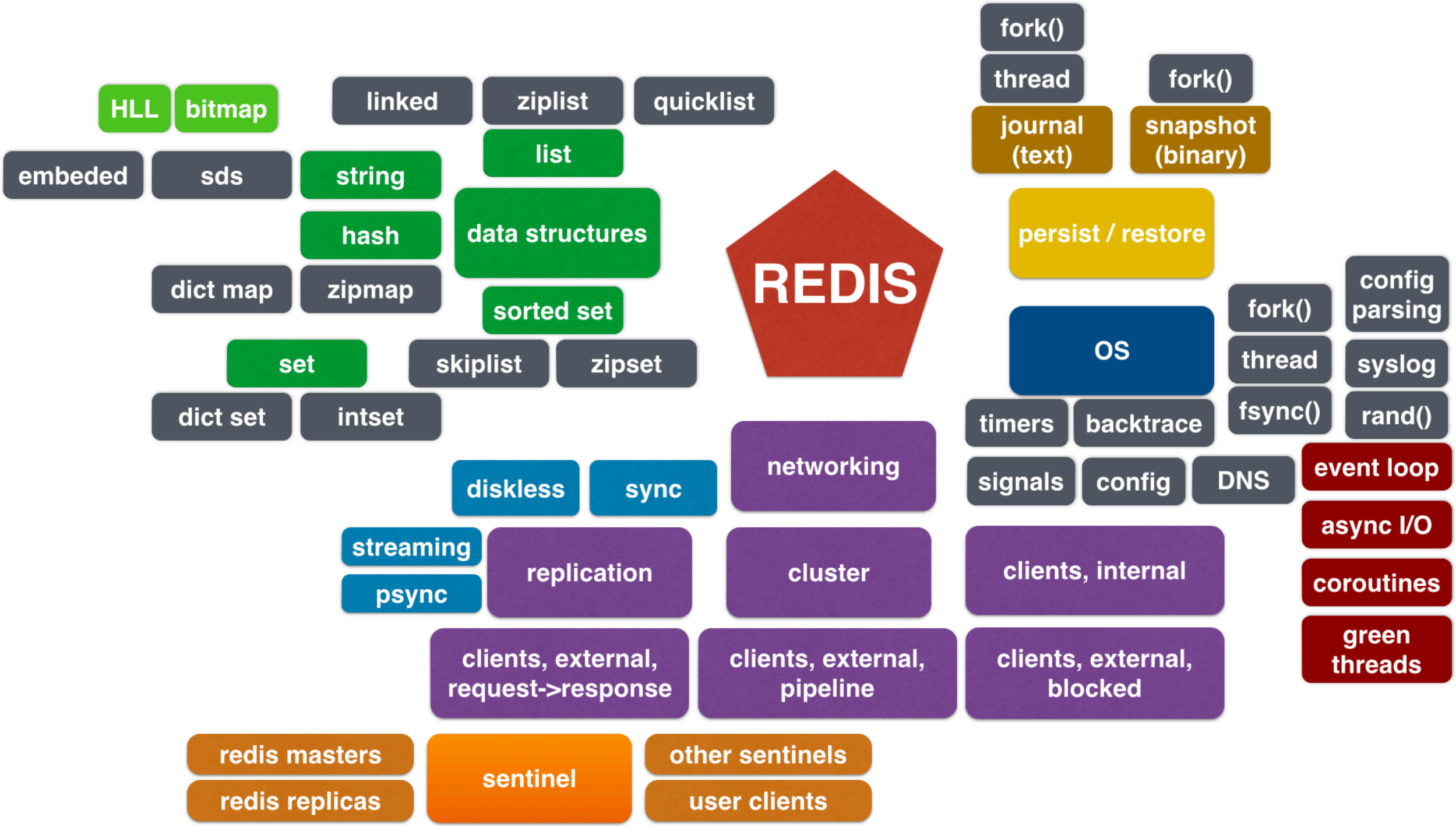
Architecture



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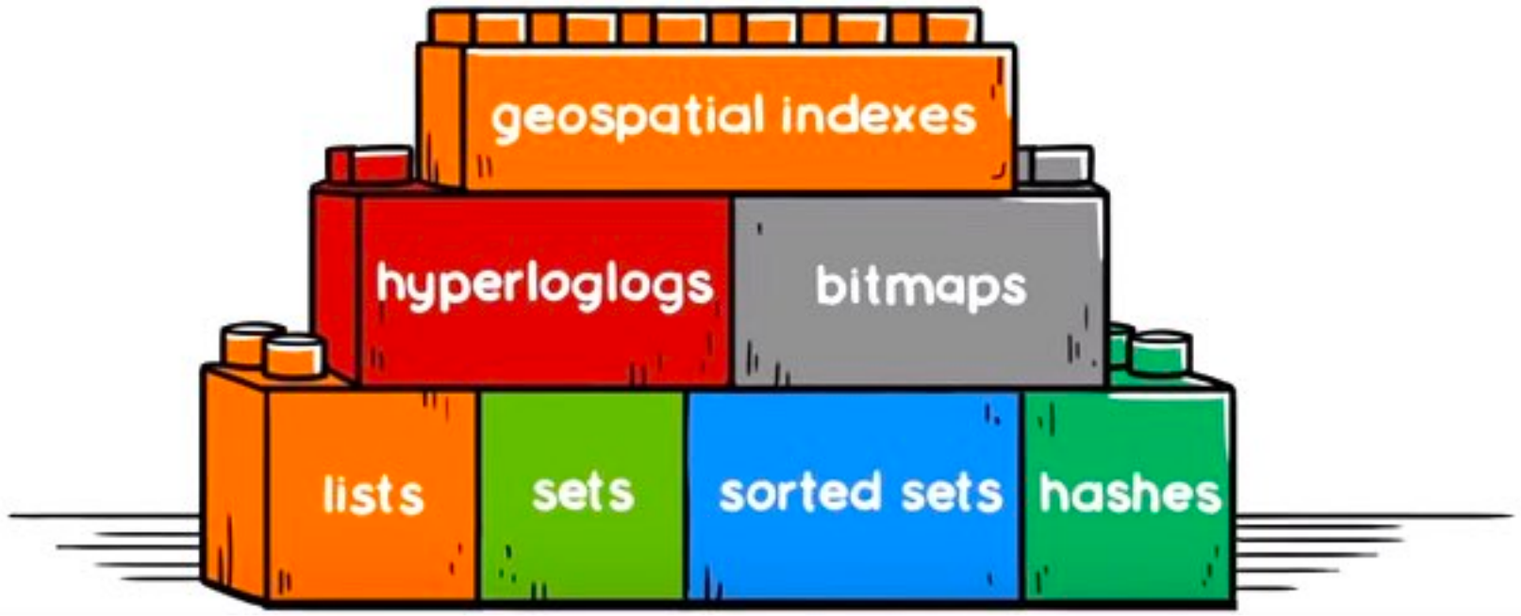
Data Structure



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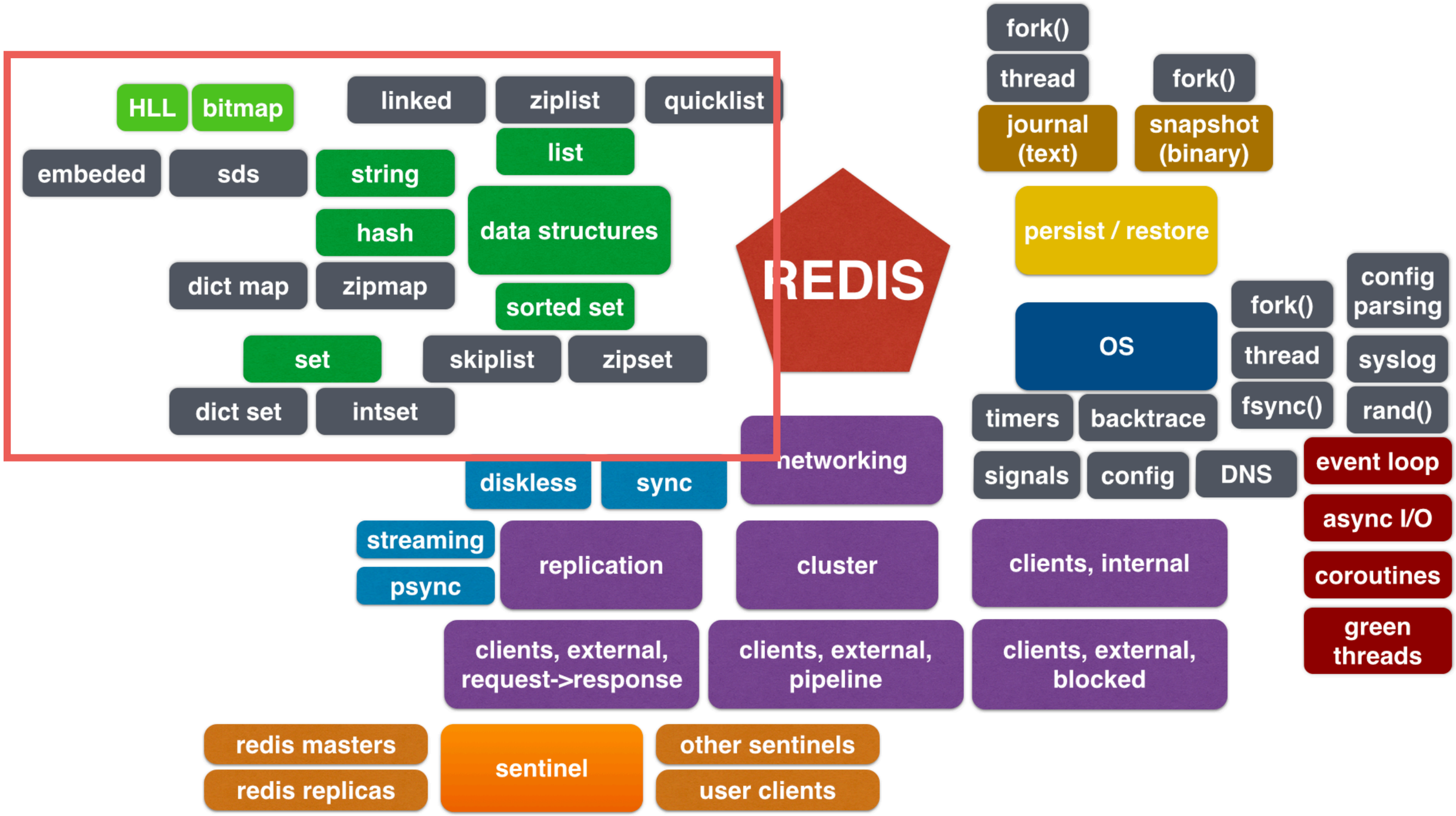
Data Structure



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Data Structure

String
List
Set
Sorted Set
Hash
Geospatial
JSON

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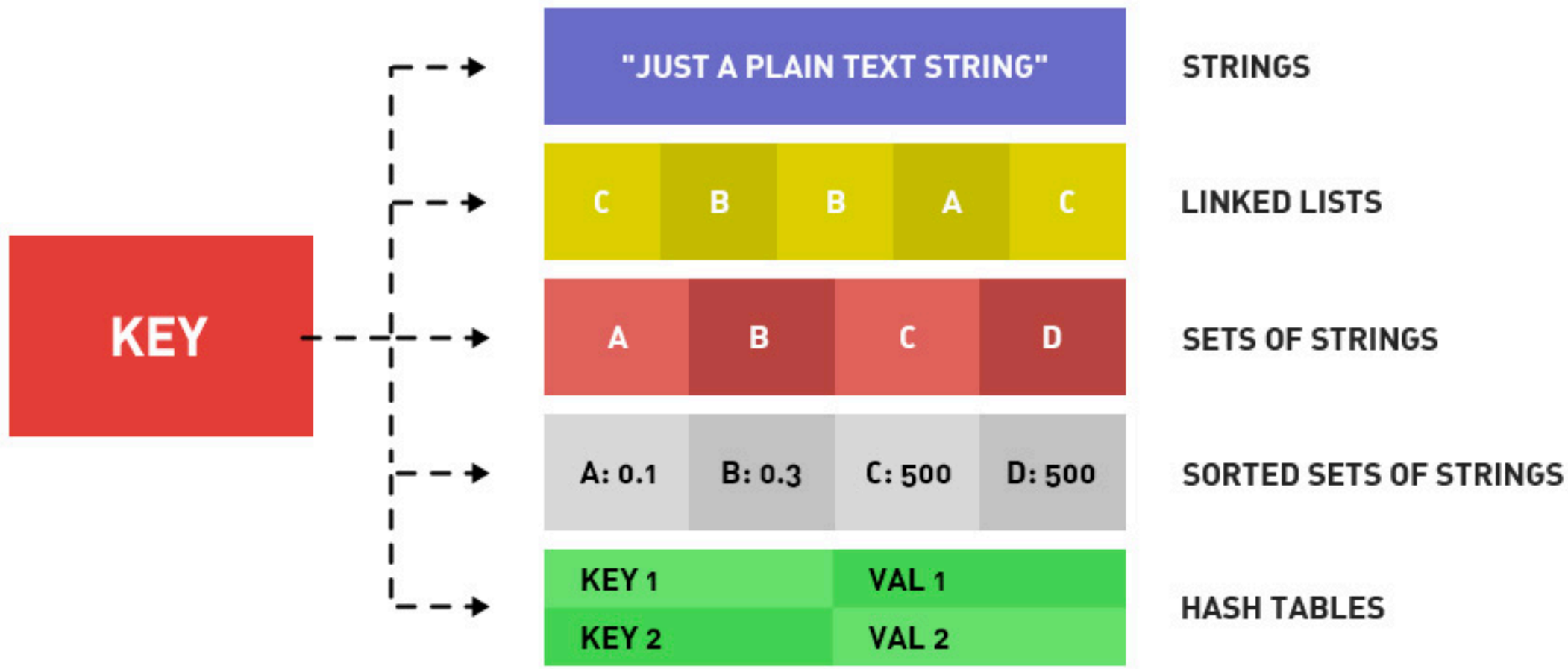
Data Structure



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More …

Search
Pub/Sub

Script with Lua

https://redis.io/docs/manual/programmability/eval-intro/

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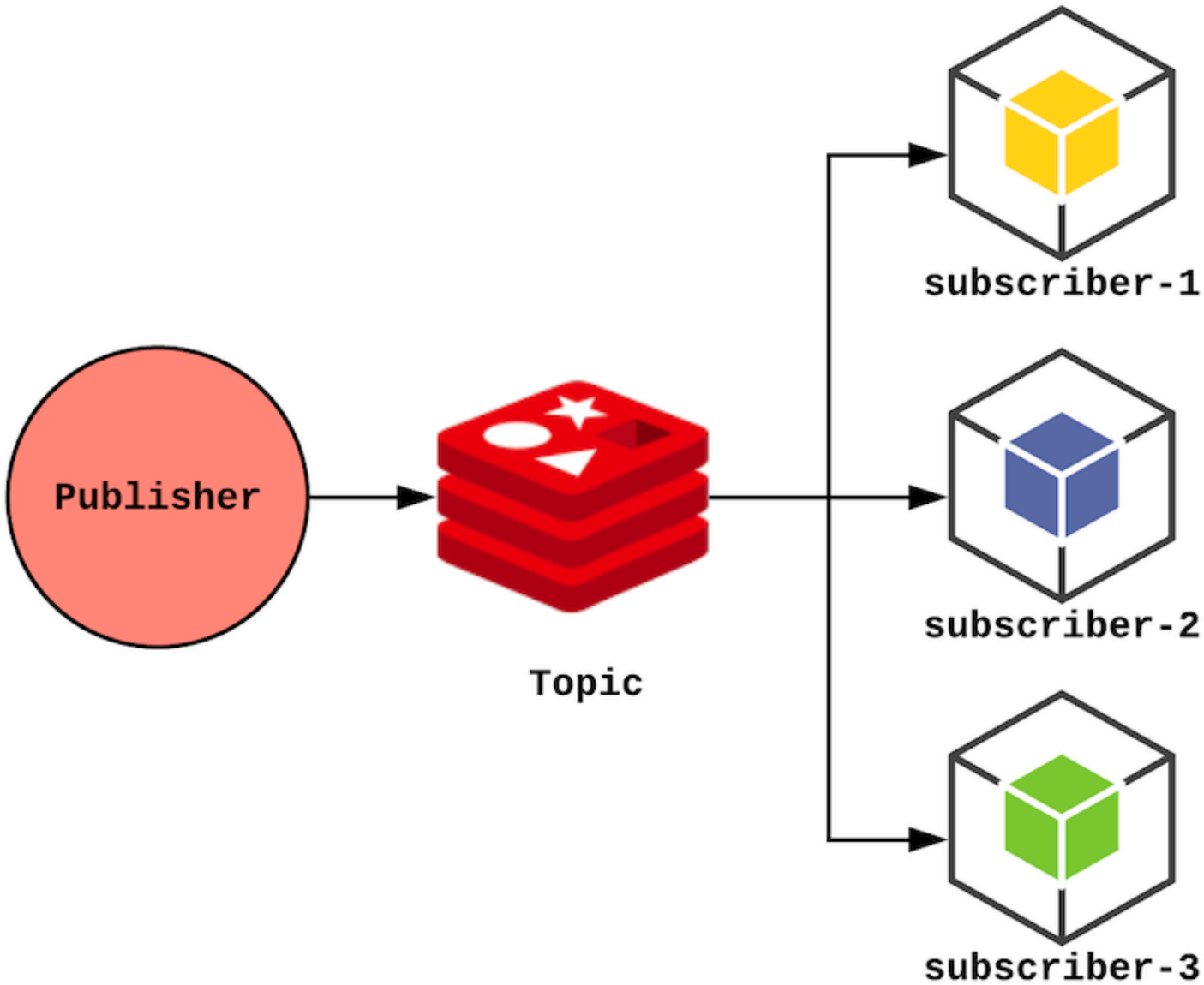
Pub/Sub



https://redis.io/docs/manual/pubsub/

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Comparison

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Compare with Others

	Redis	Memcached	MongoDB
In-memory	X	X	
Persistent	X		X
Key-value store	X	X	
Supports more than strings	X		X
Multithreaded		X	X
Supports larger-than-memory dataset			X
As fast as	Memory	Memory	Disk

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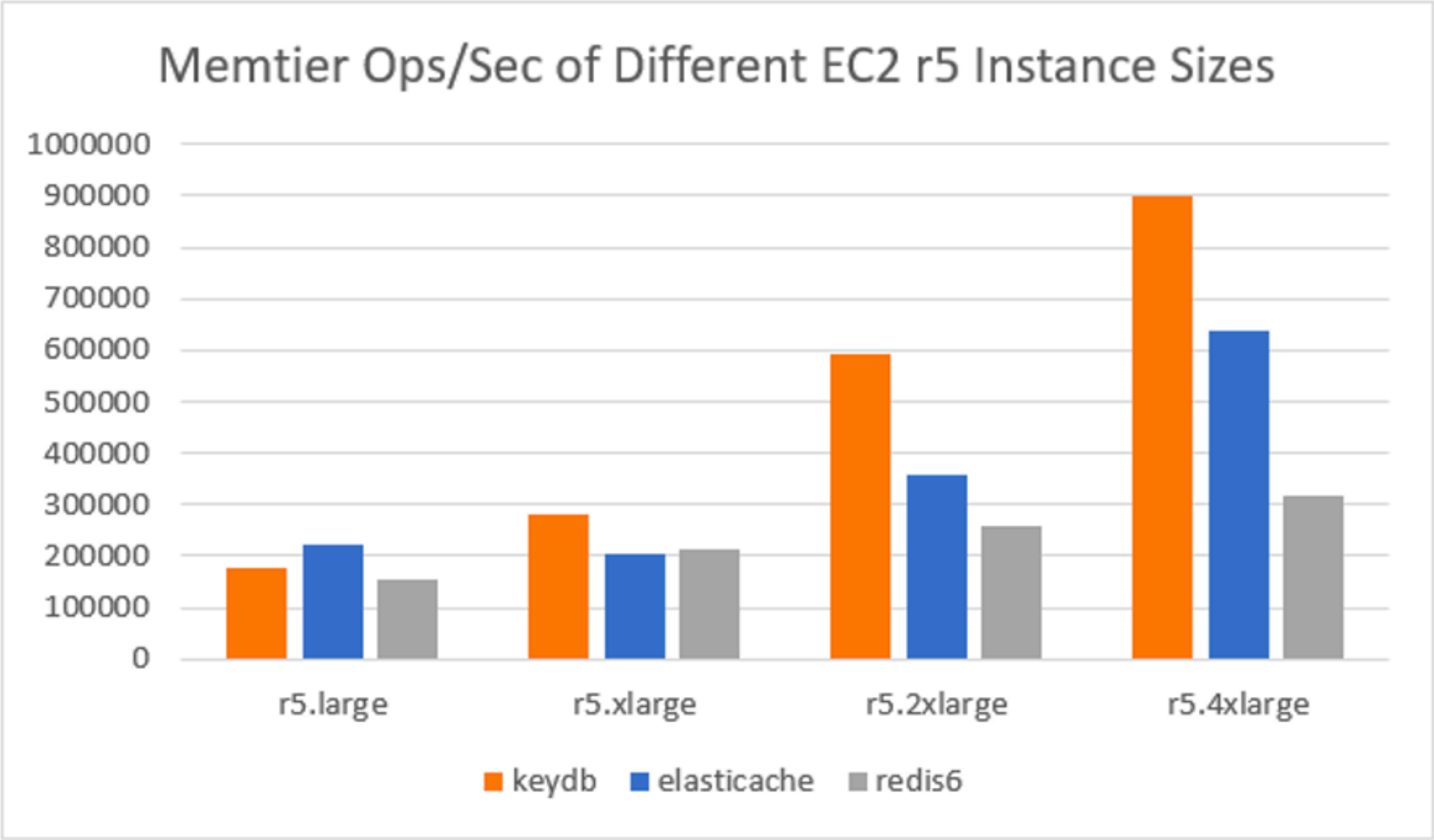
Compare with Others



https://docs.keydb.dev/blog/2020/04/15/blog-post/

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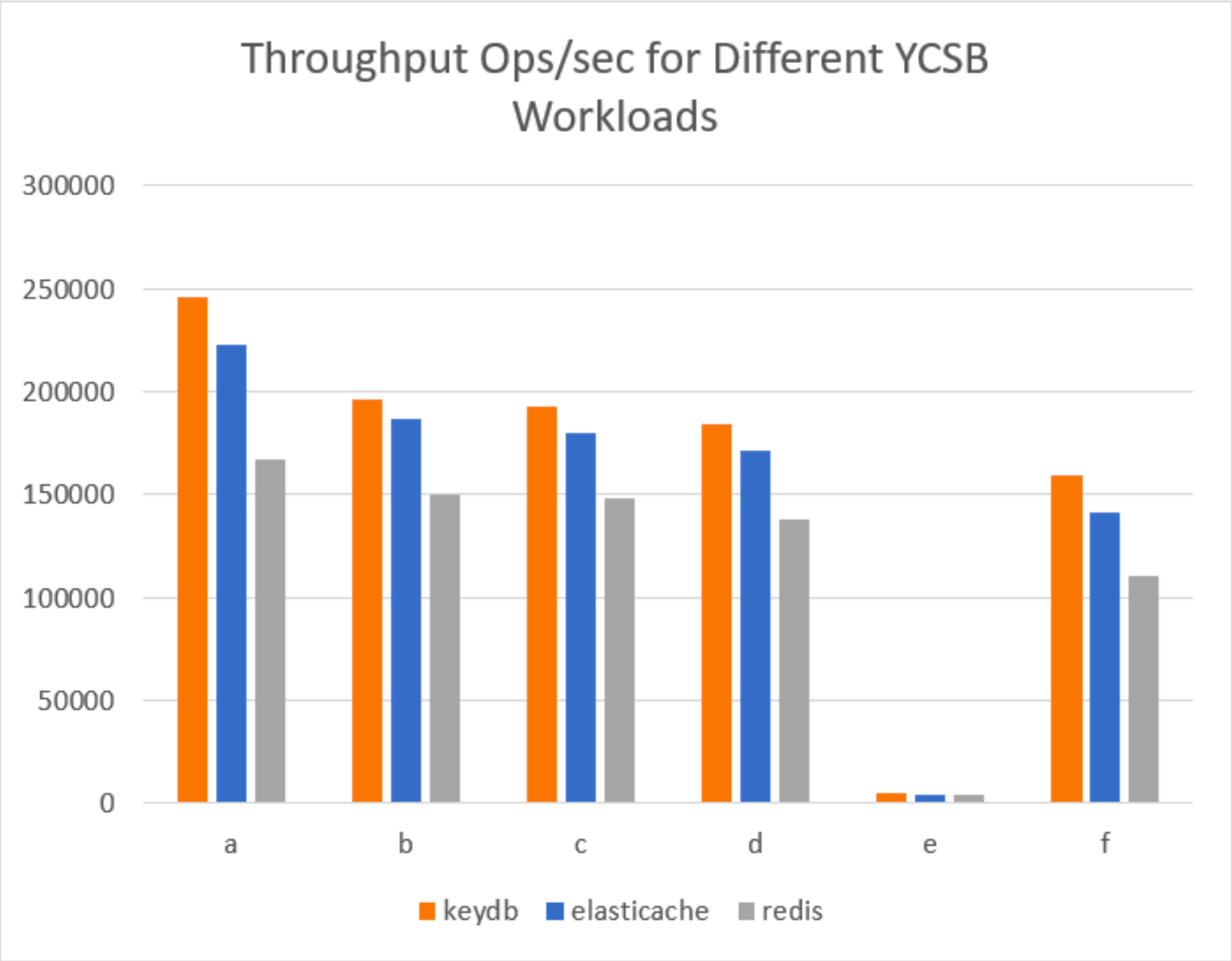
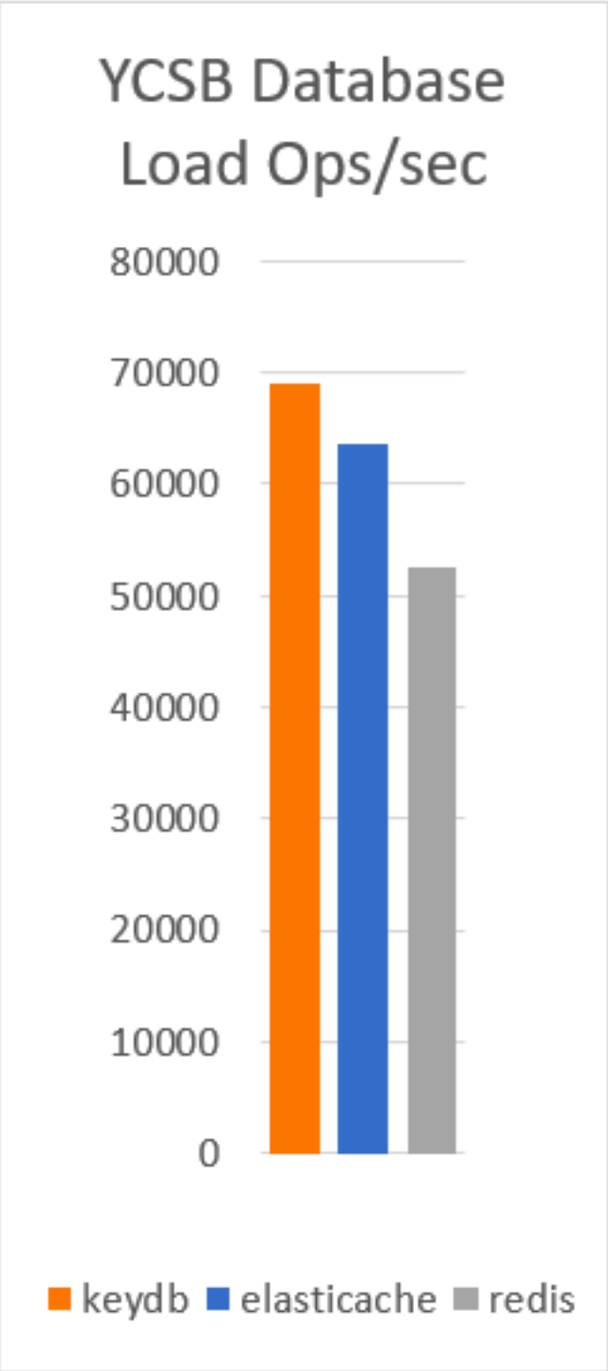
Compare with Others





https://docs.keydb.dev/blog/2020/04/15/blog-post/

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Redis Topologies

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Redis Topologies

- Single instance
- Sentinel
- Cluster
- Configuration and Monitoring

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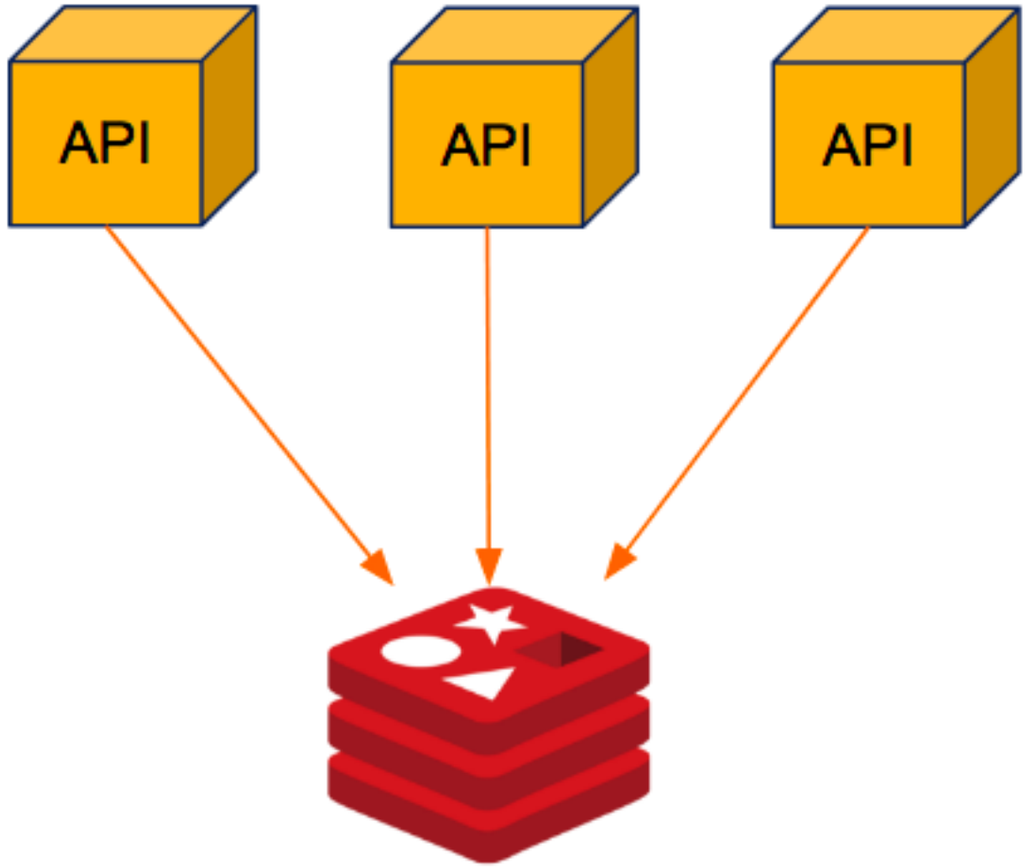
1. Single instance

Simple in running and configuration
Limited by host's resources (cpu and memory)
Running on port = **6379**



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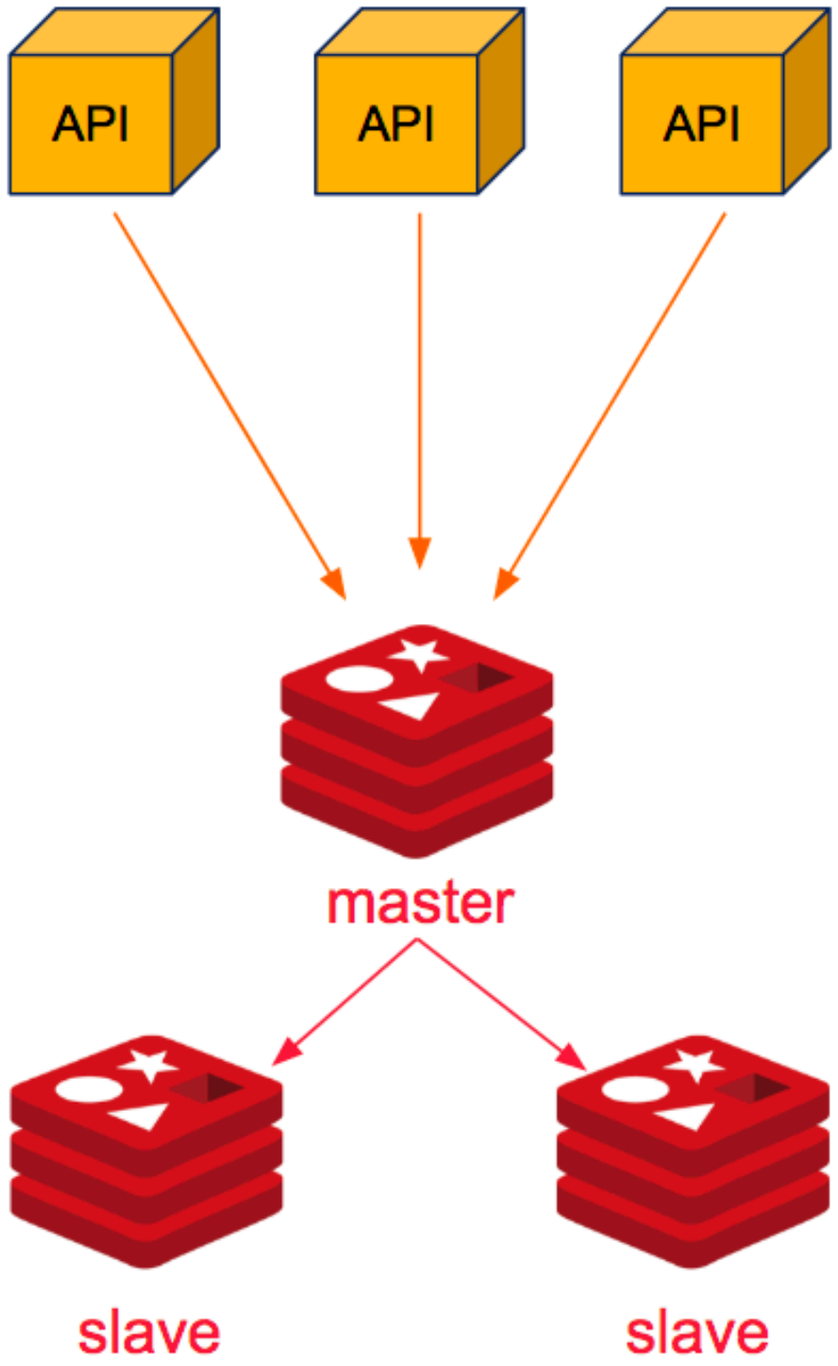
2. Master-slave replication



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2. Master-slave replication

1. Data will be updated on master node
2. Master node will push changes to slave nodes

Simple configuration but write operations are limit by master's resources

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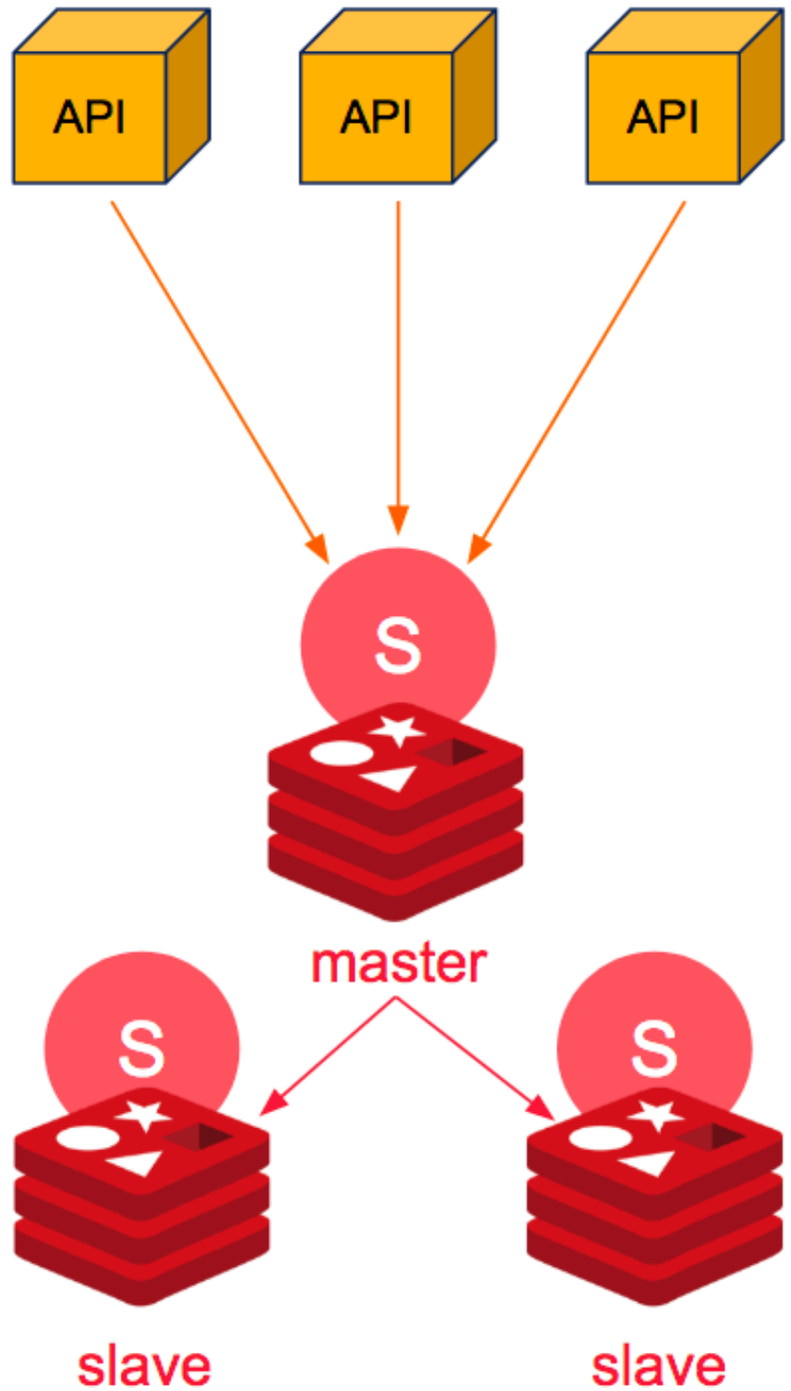
3. Redis sentinel



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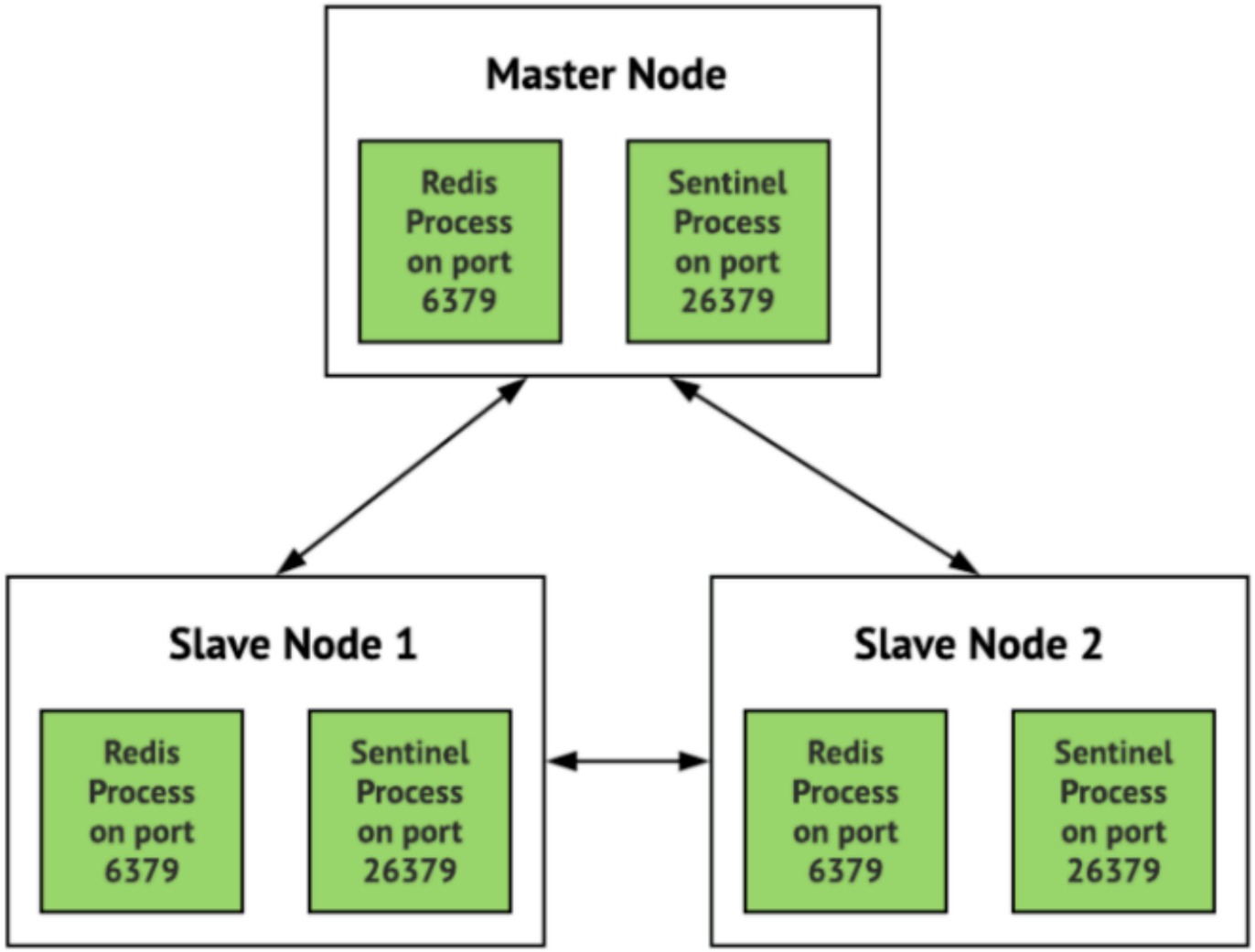
3. Redis sentinel

Running sentinel process on port = **26379**



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3. Redis sentinel

Similar with Redis replication
Improve from replication (High availability)

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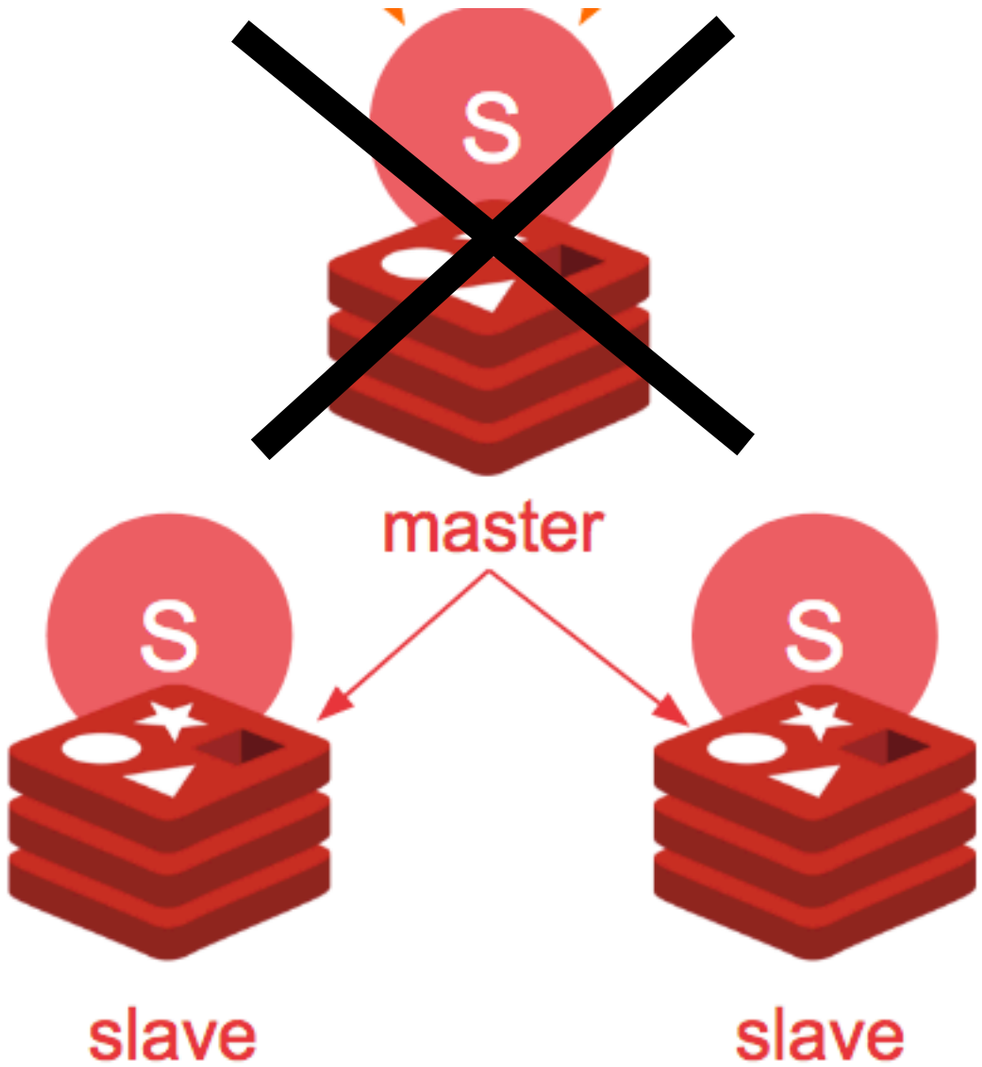
Master Down !!



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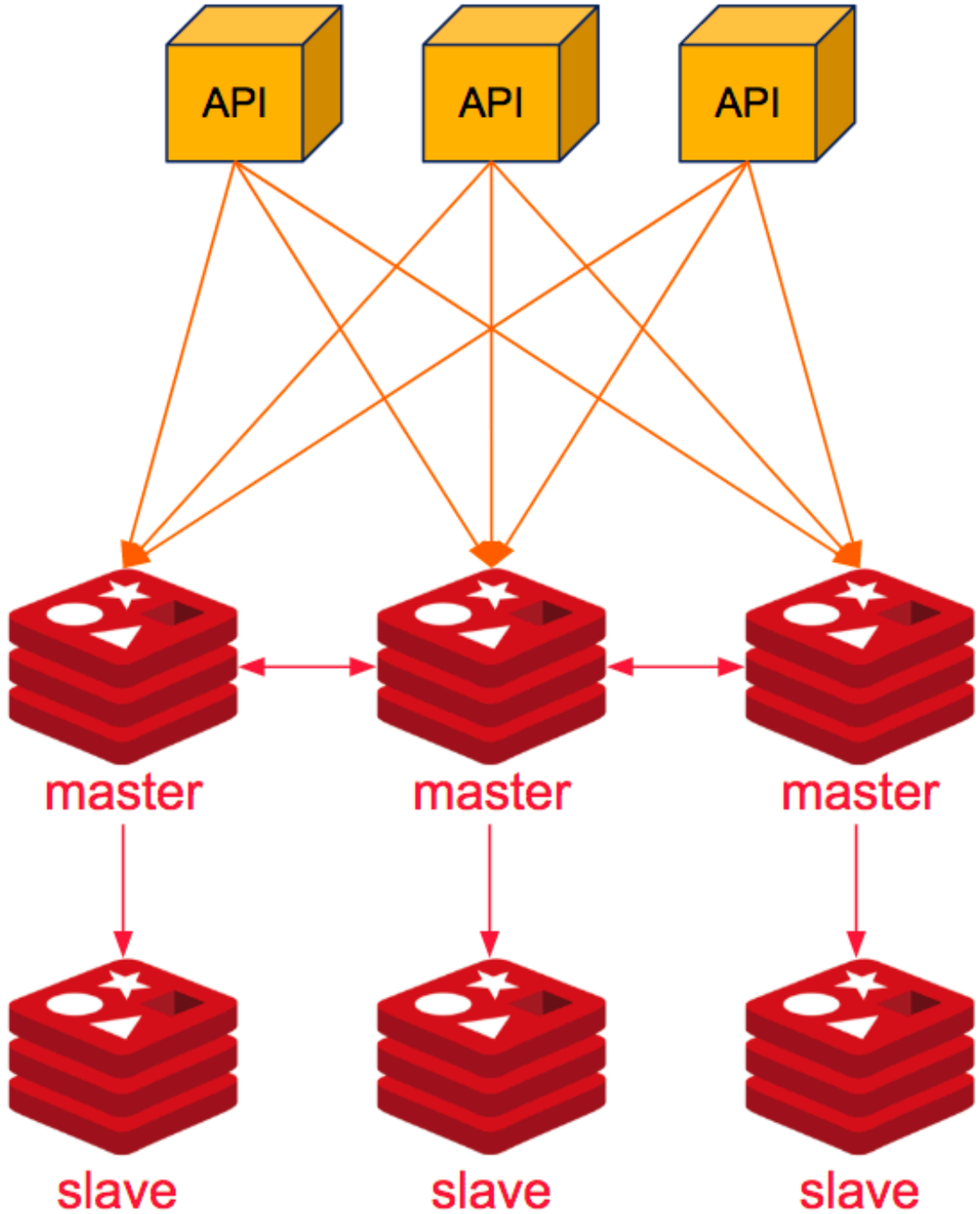
4. Redis cluster



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4. Redis cluster

Replication + Cluster + Sharding

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4. Redis cluster

Most powerful solution
Minimum 6 redis nodes
3 master nodes
3 slave nodes

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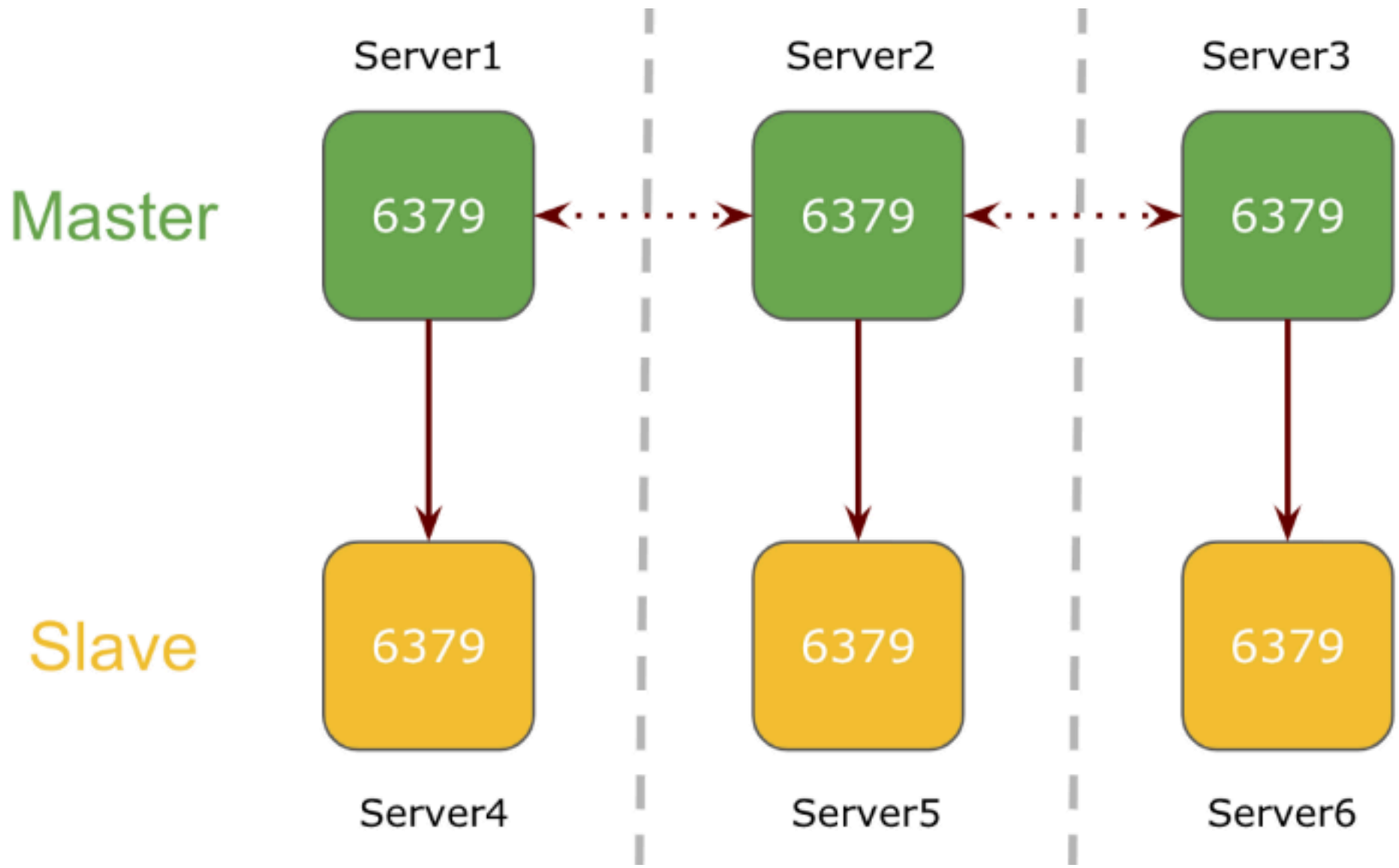
Port = 6379

1. Client connections and communications



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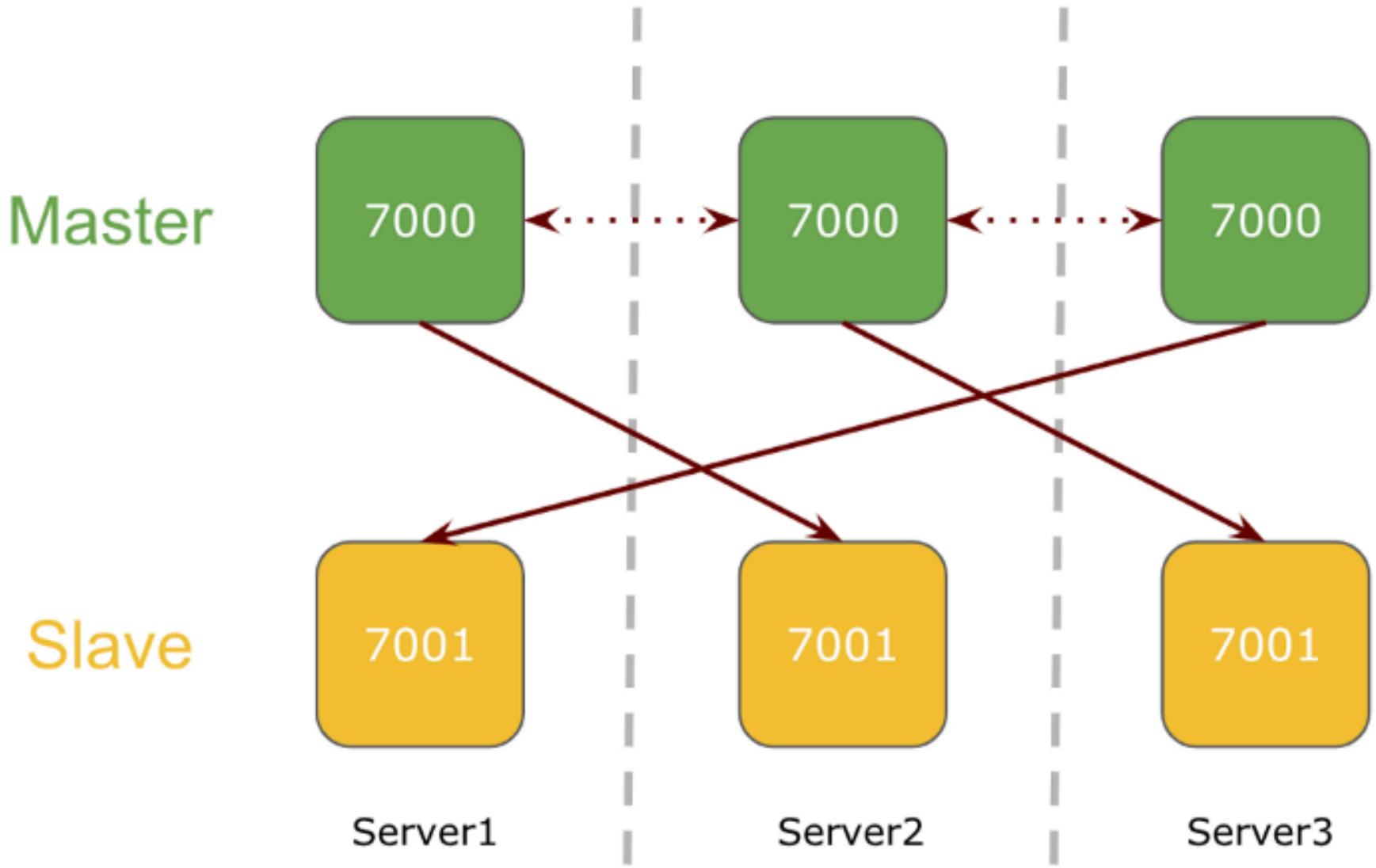
Port = 7000,7001

2. Node-to-node communications



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Advantages

High performance
High availability
Horizontal and vertical scalability
Native solution (no external proxy)

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Limitations

Required client support

Limited **multi-key operation** support

Only supports one database (database = 0)

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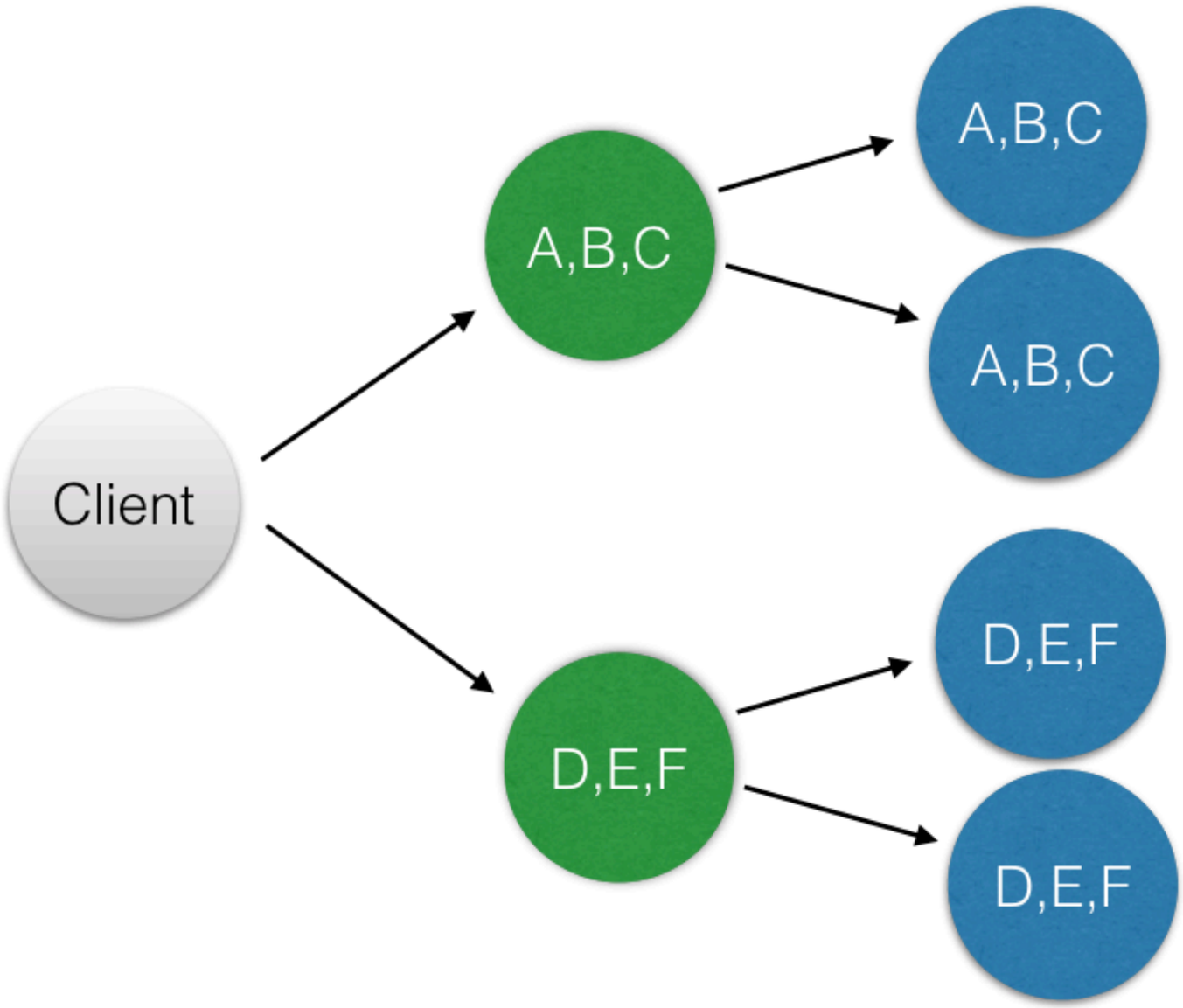
Redis cluster

Sharding and asynchronous **replication**



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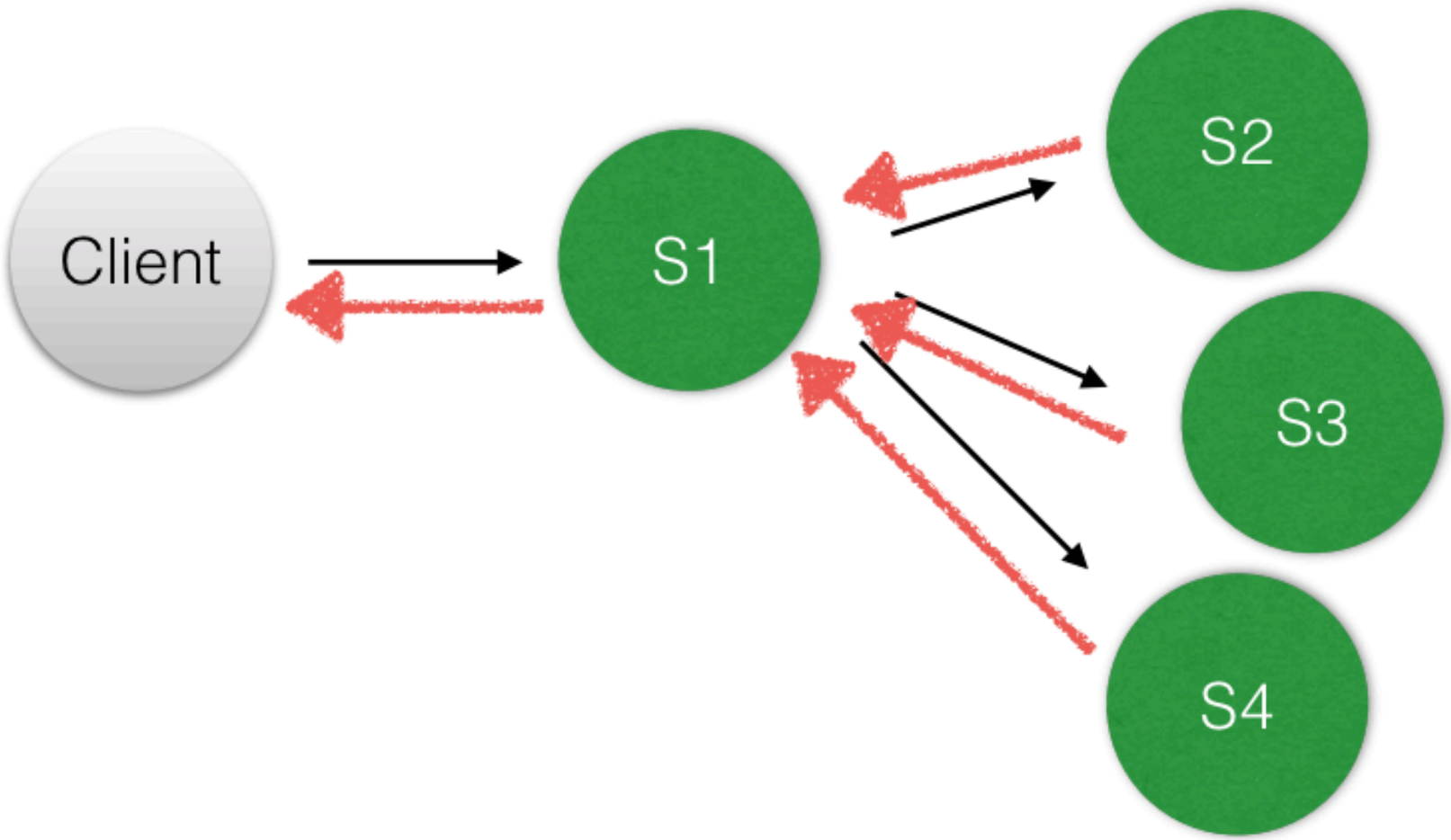
CP system

Consistency is added latency !!



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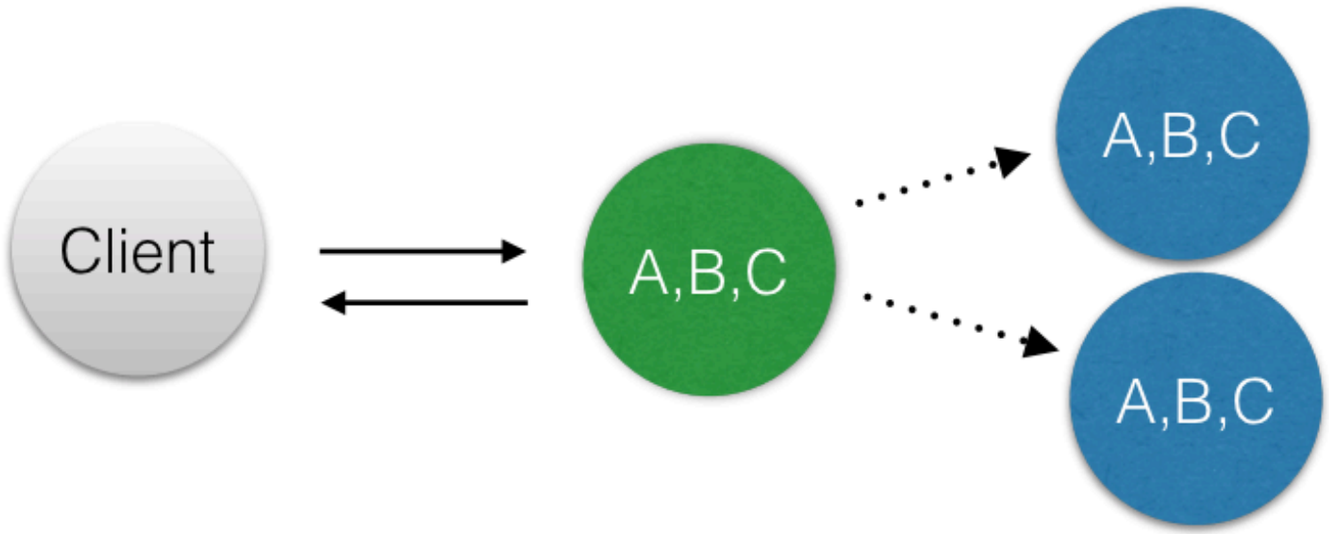
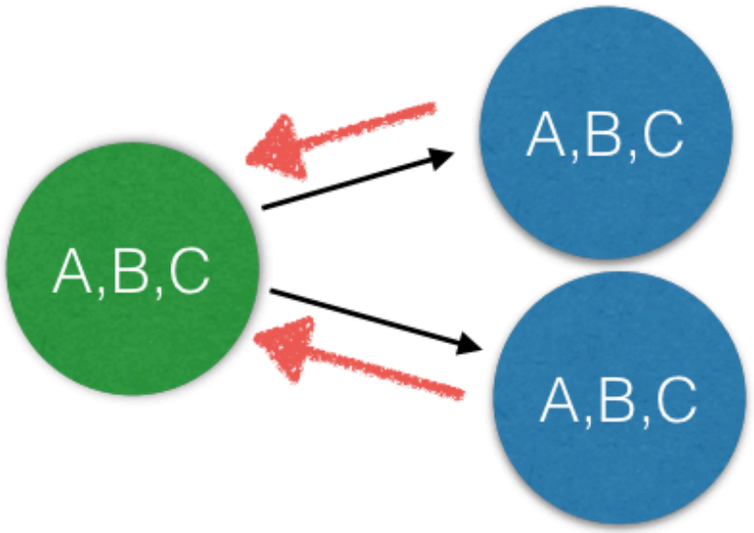
Asynchronous replication



async ACK



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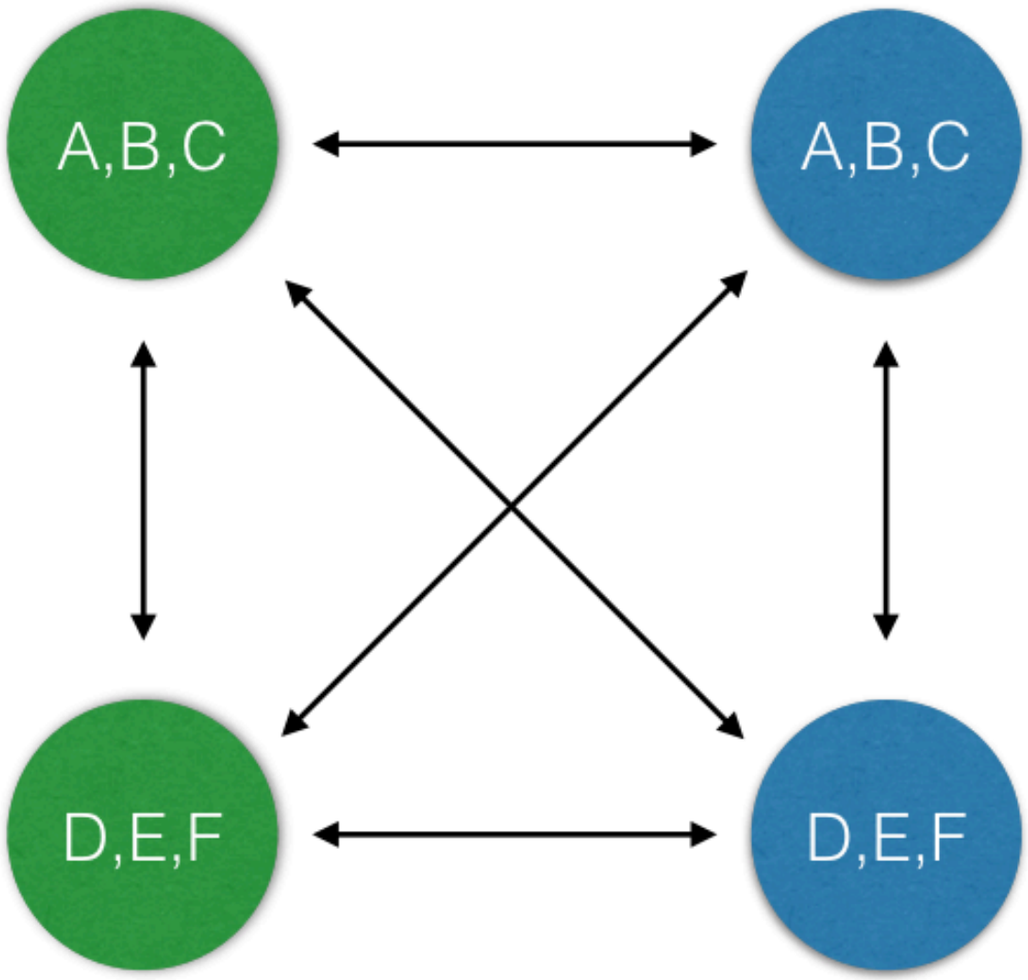
Full mesh



- Heartbeats.
- Nodes gossip.
- Failover auth.
- Config update.

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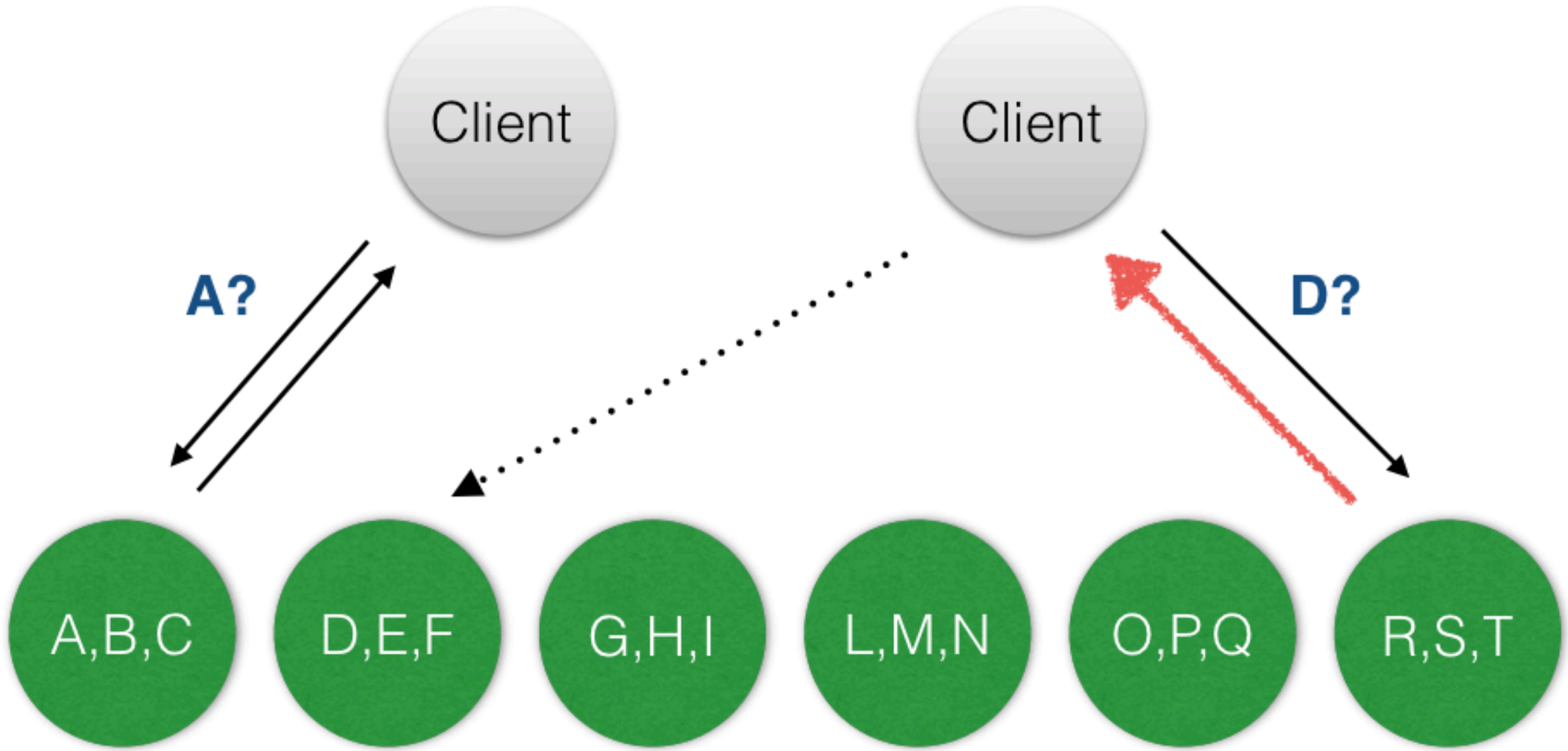
No proxy, but redirection



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Sharding

Data is automatically sharded across multiple Redis nodes.

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Sharding

The cluster uses hash partitioning to split the keyspace into **16,384 key slots**, with each master responsible for a subset of those slots

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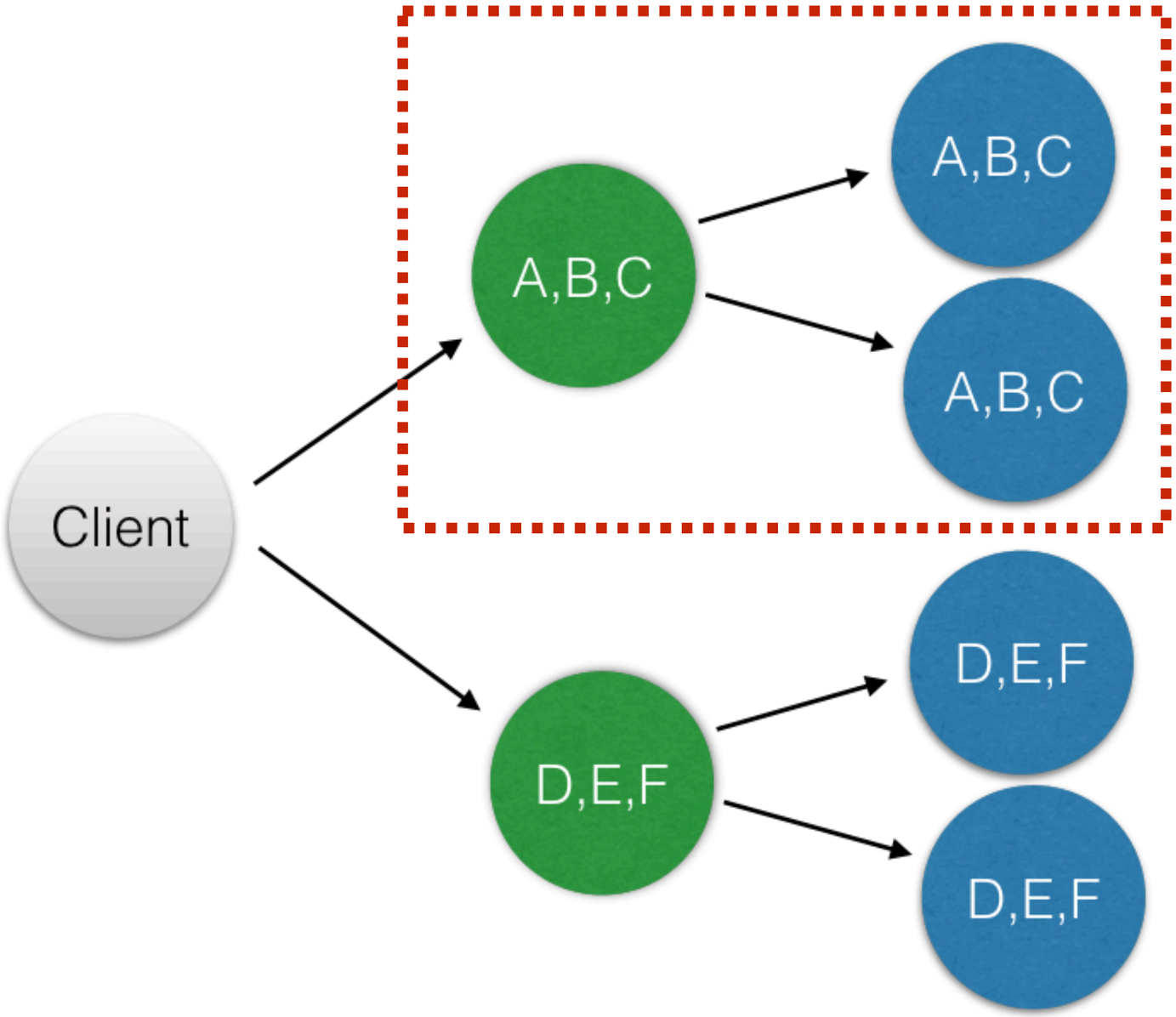
Sharding

Each slave replicates a specific master



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Example Sharding

Hash slot = 16,384

All data are divides into slots

Server	Hash slot (Bucket)
1	0-5,500
2	5501-11,000
3	11,001-16383

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Redis Configuration

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Redis Config

File redis.conf

Default for dev and testing only !!

https://redis.io/docs/manual/config/

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Redis Config

Max memory

Max memory policy (eviction)

Persist data

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Eviction policies

- **noeviction**: New values aren't saved when memory limit is reached. When a database uses replication, this applies to the primary database
- **allkeys-lru**: Keeps most recently used keys; removes least recently used (LRU) keys
- **allkeys-lfu**: Keeps frequently used keys; removes least frequently used (LFU) keys
- **volatile-lru**: Removes least recently used keys with the `expire` field set to `true`.
- **volatile-lfu**: Removes least frequently used keys with the `expire` field set to `true`.
- **allkeys-random**: Randomly removes keys to make space for the new data added.
- **volatile-random**: Randomly removes keys with `expire` field set to `true`.
- **volatile-ttl**: Removes keys with `expire` field set to `true` and the shortest remaining time-to-live (TTL) value.

https://redis.io/docs/manual/eviction/#eviction-policies

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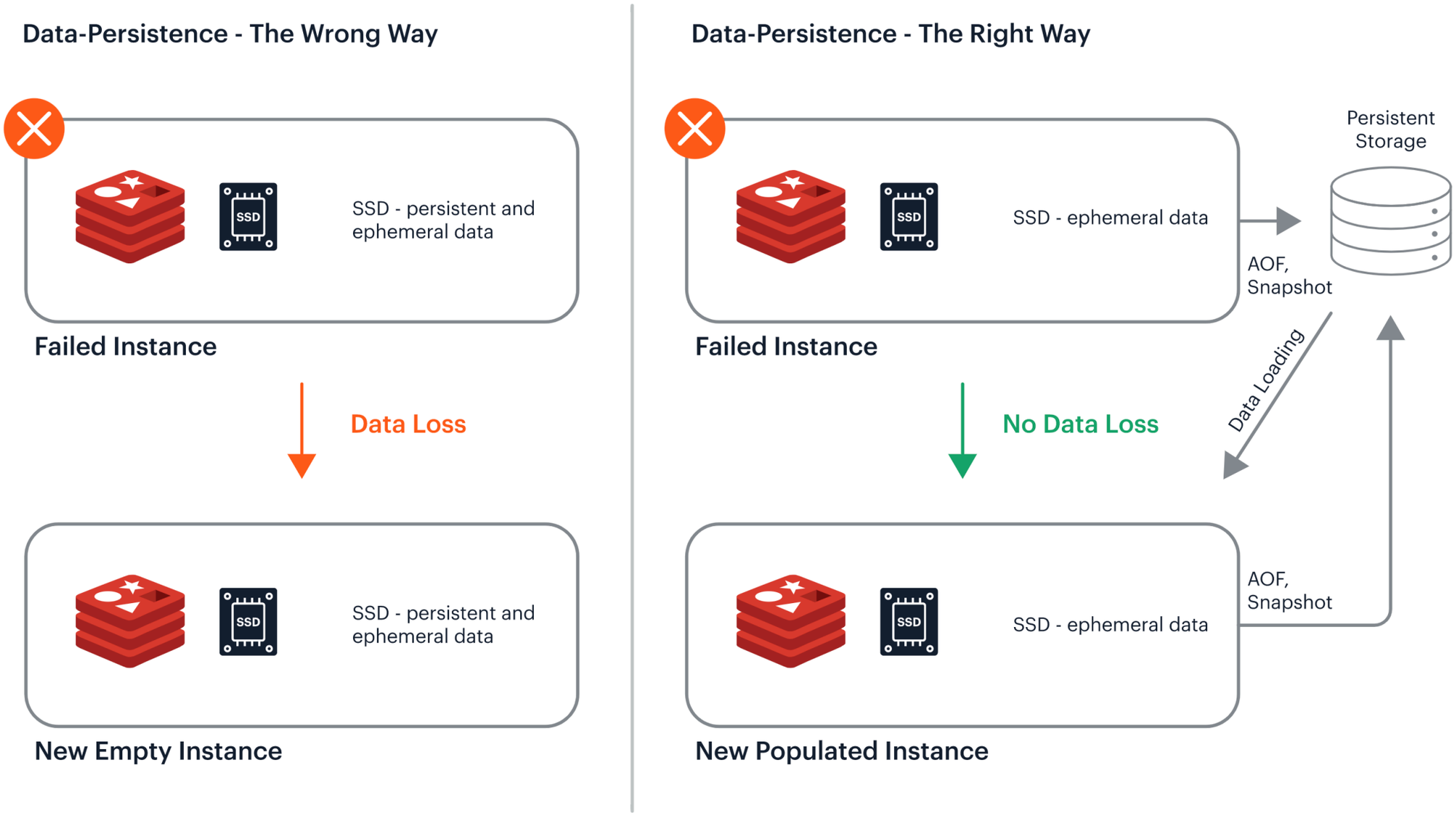
Redis Persistence



https://redis.io/docs/manual/persistence/

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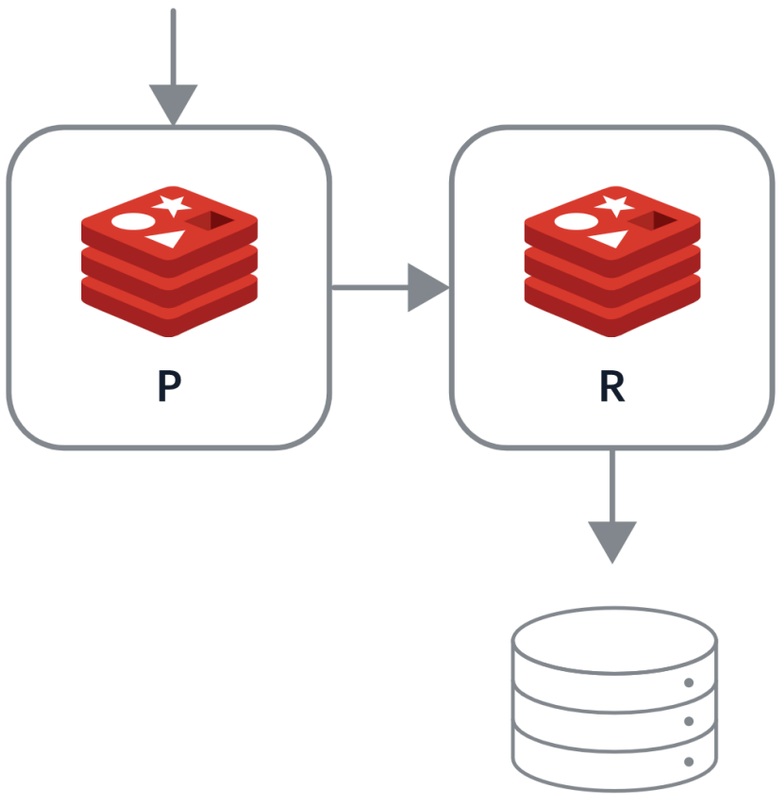
Redis Persistence

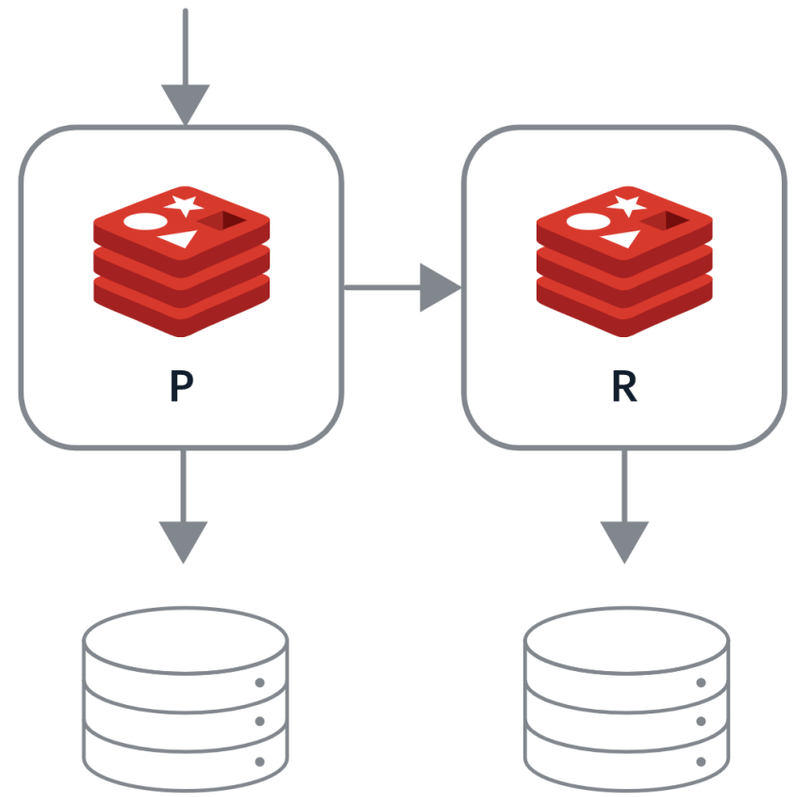
Tuned for Speed

Data-Persistence at the replica



Tuned for Reliability

Data-Persistence at the primary & replica



https://redis.io/docs/manual/persistence/

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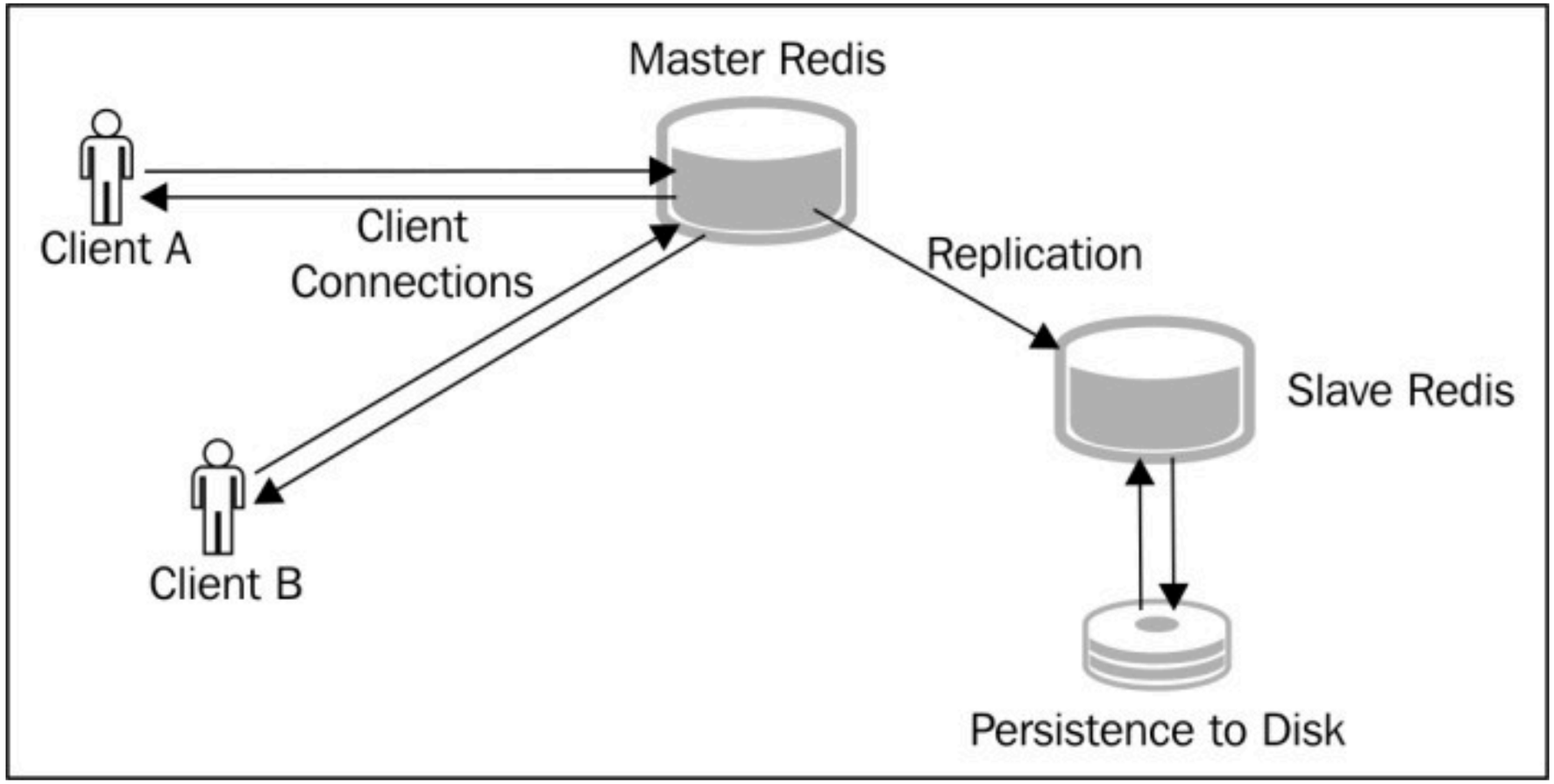
Redis Persistence

Working on Slave node



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Redis Persistence

RDB (Redis database)

AOF (Append Only File)

No persistence

RDB + AOF

https://redis.io/docs/manual/persistence/

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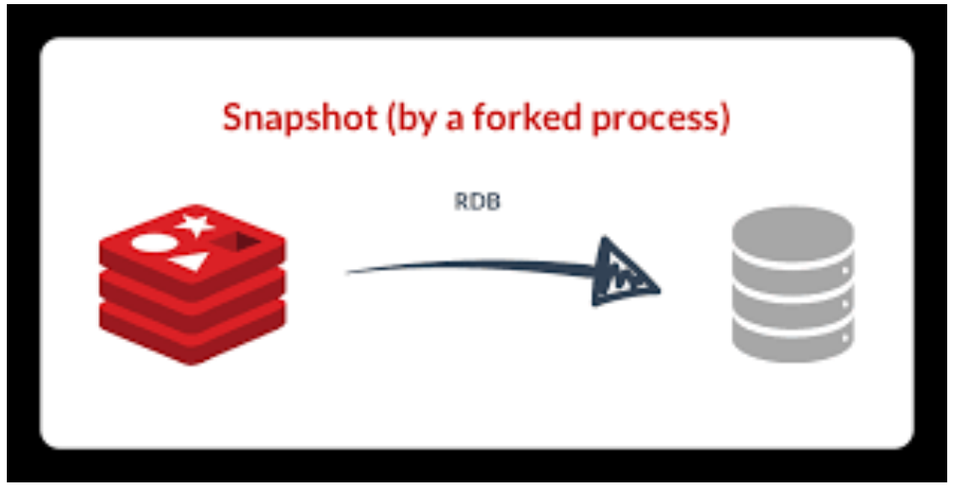
RDB (Redis Database)

Default persistence
Snapshot, period of time
Save in file **dump.rdb**



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RDB (Redis Database)

Change schedule in file **redis.conf**

```
save 900 1
save 300 10
save 600 10000
```


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RDB (Redis Database)

Change schedule in file **redis.conf**

```
save 900 1
save 300 10
save 600 10000
```

Within 900 sec, if more than one key is modified, a snapshot is saved

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AOF (Append Only File)

Write every write/delete command
Required durable
Save in file **appendonly.aof**

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AOF (Append Only File)

Save in file **appendonly.aof**

Config in file **redis.conf**

appendfsync yes
appendfsync always
appendfsync everysec

https://redis.io/docs/manual/persistence/#how-durable-is-the-append-only-file

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AOF (Append Only File)

appendfsync yes *Turn on AOF*
appendfsync always
appendfsync everysec

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AOF (Append Only File)

appendfsync yes
appendfsync always
appendfsync everysec

Write data to file for every modified command

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AOF (Append Only File)

appendfsync yes
appendfsync always
appendfsync everysec

Turn on the sync once per second

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RDB vs AOF

	RDB	AOF
Data size	Low	High
Performance	Good	Bad
Durability of data	Not good	Good (A second)

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Monitoring

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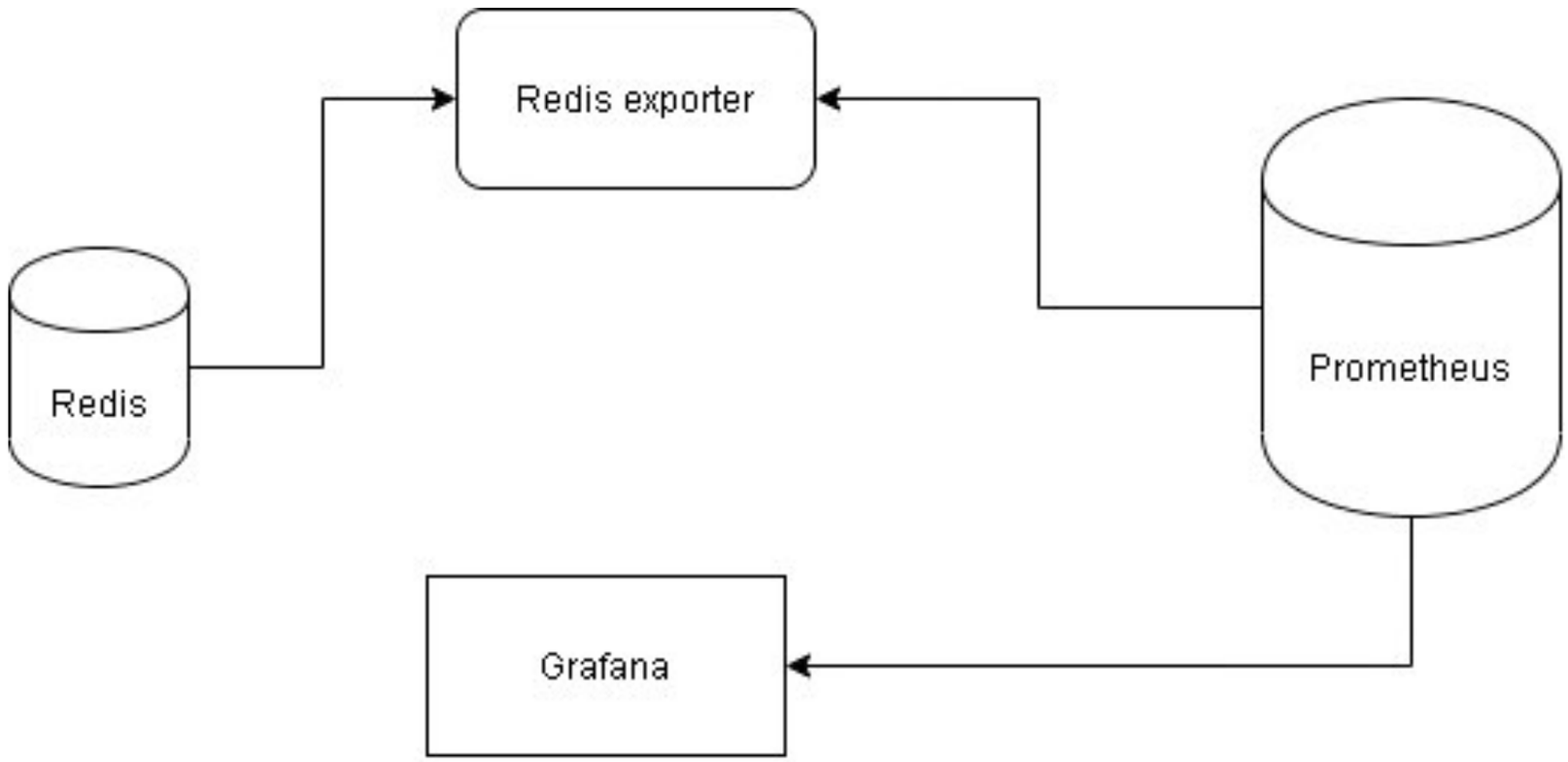
Redis exporter



https://github.com/oliver006/redis_exporter

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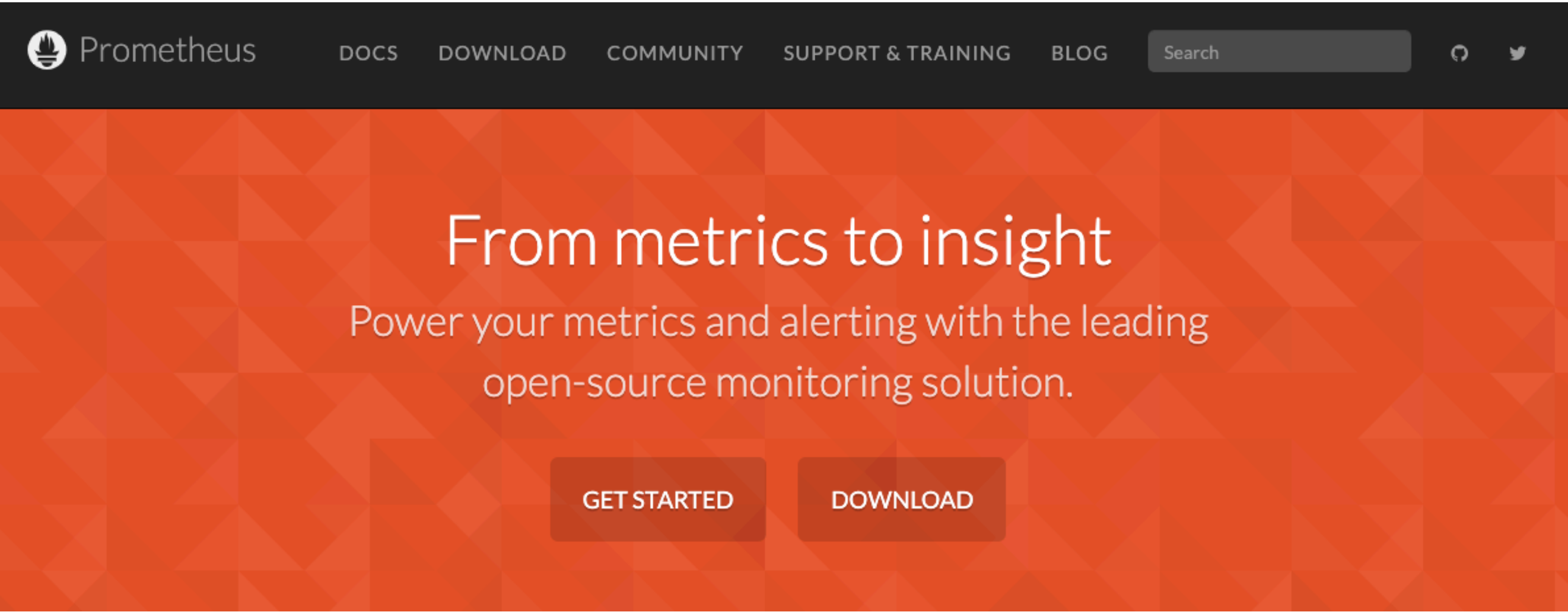
Prometheus

Time series database



https://prometheus.io/

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Grafana

Visualization server

https://grafana.com/

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